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SERIE: FISKERI · BIND X

NR. 7. Å. VEDEL TÅNING: MIGRATION OF COD MARKED ON THE SPAWNING PLACES OFF THE FAROES

KØBENHAVN
C. A. REITZELS FORLAG
BIANCO LUNOS BOGTRYKKERI A/S
1940

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MEDDELELSER FRA KOMMISSIONEN
FOR DANMARKS FISKERI- OG HAVUNDERSØGELSER
SERIE: FISKERI · BIND X · NR. 7 · 1940

MIGRATION OF COD MARKED ON THE SPAWNING PLACES OFF THE FAROES

BY

Å. VEDEL TÅNING

KØBENHAVN
C. A. REITZELS FORLAG
BIANCO LUNOS BOGTRYKKERI A/S, KBHVN.
1940

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INTRODUCTION

During a long series of years cod migrations in Faroese waters have been the object of investigations by marking experiments by "The Danish Committee for Fisheries Investigations and the Study of the Sea"; Table 1 records all markings made off the Faroe Islands, chiefly carried out by the Committee, some by the Fishery Board for Scotland, thanks to the courtesy of Dr. R. S. CLARK; the latter experiments are however not included in the present report, as the majority of the specimens marked were codling. A single large-scale experiment has been made at the Faroe Bank (1910), but this area is outside the present discussion.

Experiments made at the Faroes proper must be divided into two groups characterized by the stage of maturity of the cod marked, viz., immature and mature specimens. Marking experiments on immature cod were made chiefly within the period 1909—1925, and have been treated by A. C. STRUBBERG in 1916[1]) and 1933[2]) as regards the wanderings of these younger cod, chiefly 2 to 4 years old; STRUBBERG has proved that the wanderings of young cod, generally speaking, are very limited, locally determined, and frequently restricted to short-distance dispersions towards and away from the coast, partly seasonally determined. Of the cod marked 1909—25 few were larger individuals near maturity, or specimens which had spawned once or several times (385 out of 5000 individuals marked—or 7.7 % only—were more than 70 cm. in length). Some of these larger individuals made longer journeys, but the records being few, (79 indv.) and scattered all over the area, they have not so far been able to show the general lines in the migration of maturing or mature cod.

The second group of experiments—on mature cod—was carried out chiefly during the period 1927—1937; the markings were made in spring during the spawning season of the cod, especially in the central part of the most important spring-fishing area north of the Faroes, locally known as "Nordhavet". These experiments include a total of 1139 cod of more than 70 cm. in length, 209 of which have been recaptured (18.3 %).

Thus, from recent years a comparatively extensive material from the Faroes has been available for the study of the migrations of the mature cod marked actually during the spawning season. In the following pages the results obtained will be given from our studies of this subject which is of great importance to our understanding of the life-history of the Faroe Cod. Markings made during the months of March and April have been used preferably, as this period constitutes the hight of the spawning season, while cod marked in May includes

[1]) A. C. STRUBBERG: "Marking Experiments with Cod at the Faroes". Medd. f. Komm. f. Danm. Fisk. & Havunders., Serie Fiskeri, Vol. V, 2, 1916.

[2]) A. C. STRUBBERG: ibid., Second Report, Vol. IX, 7, 1933.

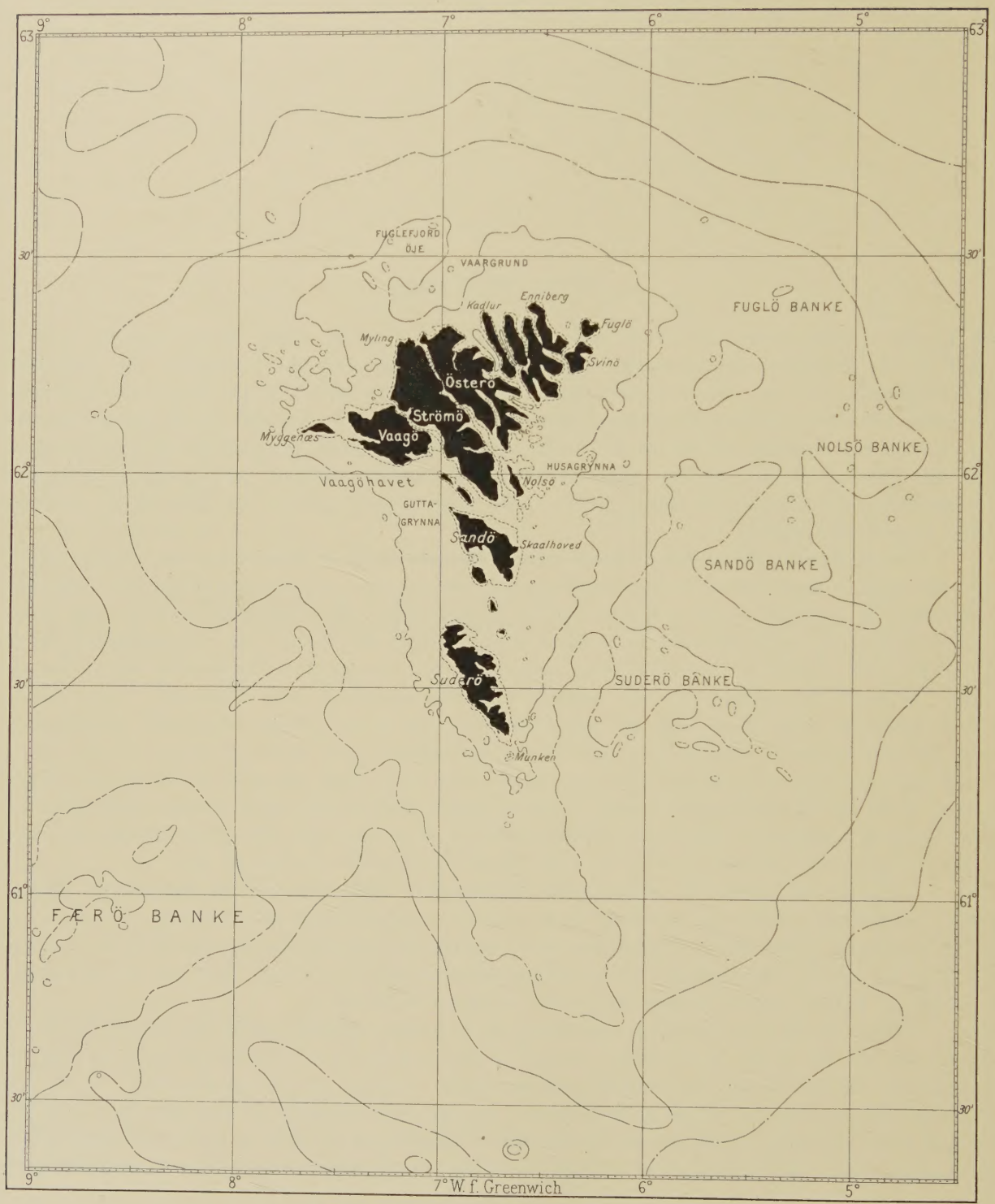

Fig. 1. The Faroe Islands. Localities.

numerous spent individuals migrating from the spawning-grounds north of the isles, an area from ancient days known as "Vaargrunden" (i. e., the spring-fishing ground).

Table 1. Cod Marking Experiments in Faroese Waters 1909—1937.
(Denmark and Scotland.)

Year	Month	No. marked	No. and percentage of specimens > 70 cm.		No. recapt.	% recapt.	No. and percentage recaptured of specimens > 70 cm.	
1909	VIII	**800**	29	3.6	474	**59.3**	9	31.0
1910	V—VI	**437**	25	5,7	147	**33.7**	6	24.0
1911	VIII—IX	**1031**	29	2.8	496	**48.1**	13	44.8
1912	VI—VII	**1023**	157	15.3	358	**35.0**	31	19.7
1913	IV & VI	**210**	39	18.6	96	**45.2**	10	25.6
1923	VII—VIII	**1192**	94	7.9	300	**25.2**	7	7.4
1924	Summer	7[1])	1	14.3	0	0	0	0
1925	VI—VII	**300**	11	3.7	121	**40.3**	3	27.3
1927	III & V	**382**	259	67.8	70	**18.3**	49	19.0
1931	Summer	**117**[1])	7	6.0	29	**24.8**	1?	14.3?
1932	IV—V	**226**	226	100.0	45	**19.9**	45	19.9
1934	IV	14	13	92.9	3	21.4	3	23.1
1935	III—IV	**244**	231	94.7	46	**18.9**	43	18.6
1936	VI	**293**[1])	13	4.4	84	**28.7**	1	7.7
1937	IV	**411**	411	100,0	69	**16.8**	69	16.8
Faroe Bank								
1910	III—IV	**585**	517	88.4	87	**14.9**	82	15.9
Total	III—IX	**7272**	2062	28.4	2424	**33.3**	371	**18.0**

[1]) Marked by Scottish authorities.

Various other marking experiments have been made off the Faroes during the period 1927—1937; these experiments, however, chiefly include marking of immature cod and will be treated later in a separate report; the few minor experiments from May 1927 and 1932, not dealing exclusively with mature fish, and having taken place nearer the coast than most others, will be subject to a brief survey only in this report. On the other hand various data from STRUBBERG's papers (l. c.) have been employed as supplementary information.

It should be emphasized here, that the present survey chiefly treats the observations on migrations, while other results have not been subject to a detailed discussion.

Table 2, p. 6 is a synopsis of certain data of the marking experiments employed in this paper.

The depth at all marking localities exceeds 50 m. and reaches in most cases about 100-130 m.—The fish were caught by hand-line from a motor-boat, marked and liberated immediately after. No specimen damaged by the hook or hurt in any other way was marked. The usual marking-method and the ordinary type of cod-marks were employed[1]).

[1]) Cf. Journal du Conseil, Vol. VIII, p. 385, 1933, and Vol. XII, p. 5, 1937.

Table 2. Approximate position of marking localities, number of cod marked etc.

A. Experiments from the months of March-April.

Year	Date	Position	Total no. of Cod marked	No. > 70 cm.
1927	$^{17\text{-}26}/_{3}$	62°29.5′ N. 6°44.5′ W. 62°33.8′ N. 6°54′ W.	199	157
1932	$^{18\text{-}29}/_{4}$	62°31′ N. 6°52′ W.	164	164
1934	$^{28}/_{4}$	62°30′ N. 6°50′ W.	14	13
1935	$^{30}/_{3}$ $^{8\text{-}13}/_{4}$	62°31′ N. 6°58′ W. 62°36′ N. 6°43′ W.	244	231
1937	$^{3}/_{4}$ $^{6\text{-}9}/_{4}$ $^{15\text{-}16}/_{4}$	62°34′ N. 6°49′ W. 62°31′ N. 6°49.5′ W. 62°29′ N. 6°49′ W.	411	411
Totals			1032	976

B. Experiments from the month of May.

Year	Date	Position	Total no. of Cod marked	No. > 70 cm.
1927	$^{7}/_{5}$	62°22.7′ N. 6°27.5′ W.	41	16
	$^{16\text{-}17}/_{5}$	62°14′ — 62°18′ N. 7°13,5′ — 7°17.8′ W.	142	86
1932	$^{18}/_{5}$	62°34′ N. 6°49′ W. 62°31′ N. 6°52′ W.	62	62
			245	164

Table 3. The size of cod marked.

Year and Date	March and April. 1927 $^{17\text{-}26}/_{3}$	1932 $^{18\text{-}29}/_{4}$	1934 $^{28}/_{4}$	1935 $^{30}/_{3}$-$^{13}/_{4}$	1937 $^{3\text{-}16}/_{4}$	March-April Total	May. 1927 $^{7}/_{5}$	1927 $^{16\text{-}17}/_{5}$	1932 $^{18}/_{5}$	May Total
5 cm.-groups										
110—114	..	..	..	2	..	*2*	..	..	..	..
105—109	..	1	4	8	2	*15*	..	..	..	..
100—104	1	5	..	14	3	*23*	..	..	2	*2*
95—99	1	12	1	13	13	*40*	..	5	7	*12*
90—94	12	35	1	18	32	*98*	3	3	5	*11*
85—89	19	31	3	38	59	*150*	5	17	11	*33*
80—84	59	31	2	57	92	*241*	6	20	15	*41*
75—79	33	27	1	45	112	*218*	1	25	12	*38*
70—74	32	22	1	36	98	*189*	1	16	10	*27*
65—69	17	..	1	8	..	*26*	4	28	..	*32*
60—64	16	..	..	4	..	*20*	3	16	..	*19*
55—59	5	..	..	1	..	*6*	17	12	..	*29*
50—54	2	..	..	..	..	*2*	..	..	..	..
45—49	2	..	..	..	..	*2*	..	..	..	..
Total...	199	164	14	244	411	*1032*	40[1])	142	62	*244*[1])
> 70...	157	164	13	231	411	*976*	16	86	62	*164*
< 70...	42	0	1	13	0	*56*	24	56	0	*80*

[1]) + 1 uncertain length.

As to methods etc. the reader is also referred to a paper in the present series dealing with markings at Greenland (Medd. f. Komm. f. Danm. Fisk. & Havunders., Ser. Fiskeri, Vol. X, 1, 1935). The marks were fixed in the gill-cover by means of Capt. Hansen's marking-needle; Figs. 2—4 show the mark, the approximate position of the mark in the gill-cover, marking-needle etc.

Table 3 records the number of fish marked, arranged by 5 cm.-groups.

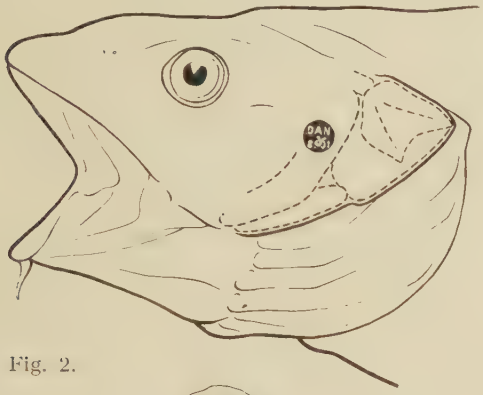

Fig. 2.

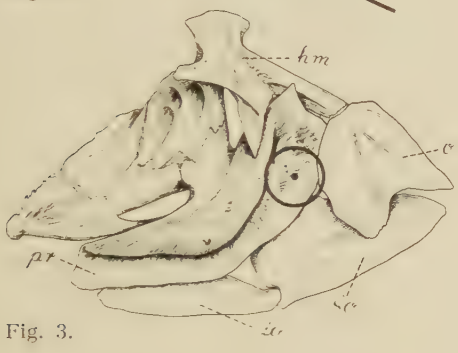

Fig. 3.

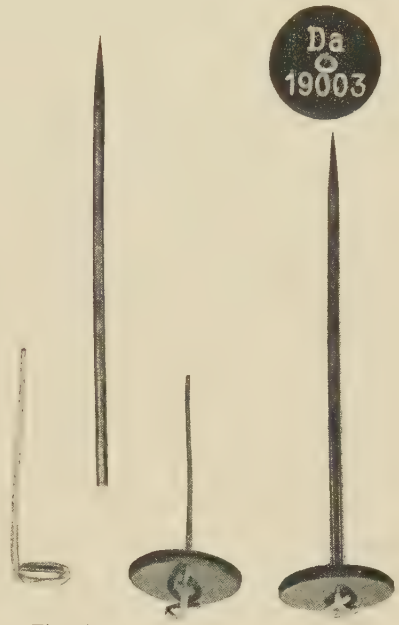

Fig. 4.

Fig. 2. Sketch of head of cod showing position of mark in relation to opercular bones (these indicated by dotted lines). Cf. Fig. 3.

Fig. 3. Opercular bones of cod. Supposed best position of mark in pre-operculum (*pr.*) indicated. From TÅNING 1937.

Fig. 4. Marking needle, silver wire and ebonite buttons used in recent Danish cod marking work. (About natural size; marking needle $6^1/_2$ cm. long.) From TÅNING 1933.

The following survey mainly deals with fish more than 70 cm. in length at marking, to make sure that the majority were mature specimens. Unfortunately, however, but few records are available as to the stage of maturity on recapture (such data, when considered of interest, have been recorded in the list of recaptures). At the Faroes—as elsewhere—some fish of more than 70 cm. length, even up to a length of about 90 cm., may still be immature, or may not have commenced the maturing process, but as far as we know such individuals, are rather scarce, and most of them will most likely mature within the following year. On the other hand, some few cod of less than 70 cm. length may be mature specimens. It being necessary, however, to choose a definite limit, 70 cm. has been preferred to e. g. 65 cm. to eliminate the majority of immature specimens from the experiments. From Table 3 it will be noticed that the majority of cod marked during March and April comes within the range 70 to 100 cm. (91 %), 4 % only measured more than 100 cm., while the balance, 5 %, was below 70.

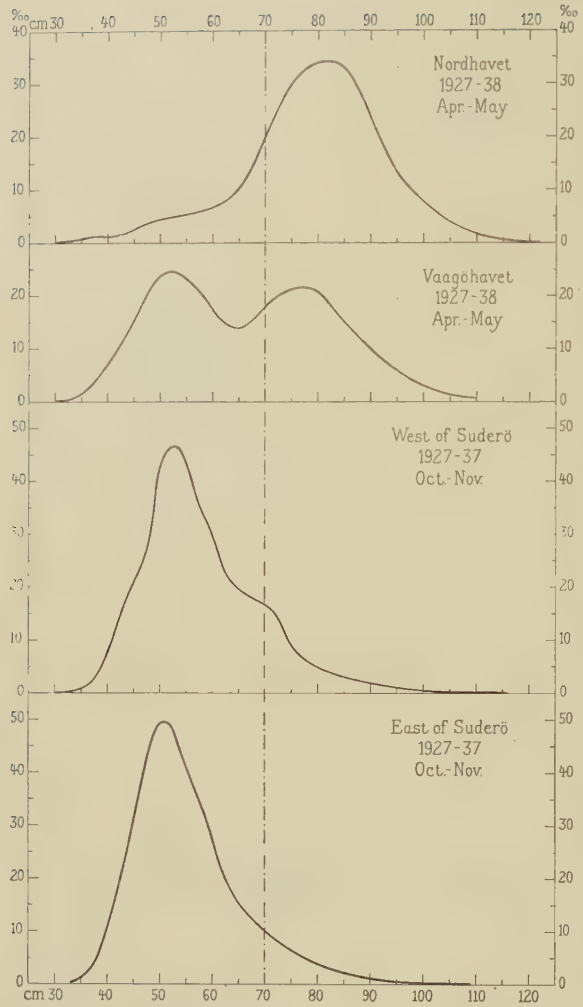

Fig. 5. Length frequencies of cod in Faroe commercial catches 1927—38.

The spawning-period being preferred to other seasons and the most important spring fishing grounds in the "Nordhavet" to other areas should secure the highest possible percentage of mature fish obtainable. Diagrams of cod measurements from various localities at the Faroes, and at various seasons, clearly illustrate the distribution of the size-groups in relation to locality and to season; Fig. 5 represents such diagrams for the period 1927—1938, with indications as to the position of the 70 cm. limit. The diagrams comprise a total of some 100,000 commercially caught specimens measured, and clearly demonstrate the concentration of large cod in the "Nordhavet" during spring.

From the records of recaptures some particulars have been excluded due to faulty details as to locality or to date of recapture; when other particulars have been considered doubtful, such records also have been excluded from use in the present survey. Unfortunately some fishermen are not very careful in recording the necessary data, but on the whole the care taken in recording details has been commendable.

Particulars of recaptures received since the beginning of these marking experiments, have been used to give a survey of the following two important questions:

1) Emigration from the spawning grounds after spawning.

This dispersal being a feeding migration, recaptures during the 6 to 7 months following the marking have been employed preferably to throw light on this question; in other words, this group comprises recaptures during the months April—October of the calendar-year within which the marking took place.

2) Return-migration to the spawning grounds during the following spawning season.

These wanderings being spawning-migrations, recaptures during the months January—May of the calendar-year following that of marking have been employed in the study of the latter subject.

The limited number of recaptures of cod which have spent a third season or more in the sea before recaught, have been included in the records and on the charts from the 1927—1937-experiments; the records further include cod measuring less than 70 cm. at marking, special cases of which have been the subject of remarks in the text dealing with the several experiments.

It should be mentioned here that previously very few records show long-distance migrations from the Faroe-area, primarily because only the larger cod undertake long-distance migrations at all, and secondly because previously the markings included a very limited number of such large fish. The intensity of the Faroe-fishery does not permit any great number of codling to grow to the size that is likely to undertake extensive wanderings. The marking of a greater number of larger cod during recent years should have increased the possibility of recording long-distance migrations. The limited number of cod recaptured outside the Faroe-area seems, however, to justify the assumption that very few cod emigrate from this area at all, and generally speaking these waters may be considered a selfcontained area, from which emigrants are scarce and which also records immigrants as exceptions.

The markings have been made partly by Mr. Joen Christiansen, teacher at the Nautical School at Thorshavn, and partly by Mr. B. Jepsen, laboratory assistant to the Marine-biological Laboratory, both of whom the author asks to accept his heartiest thanks for the carefulness shown in marking; also my sincerest thanks are due to Mrs. Inger Rosenberg for her valuable assistance during treatment of the material.

The author wishes to use this opportunity also to record his gratitude to all the fishermen who have secured marking buttons, to the Fisheries Laboratories at Lowestoft and Aberdeen, to officials and employees within the county of the Faroes, and to everybody else who has been of assistance in collecting data for this paper.

I.

The various Marking Experiments on large Cod at the Faroe Spawning Grounds 1927—37.

1. Experiments 1927. This year a total of 382 cod was marked during the months of March and May; in March a total of 199, of which 157 more than 70 cm. in length; in May a total of 183, of which 102 > 70 cm. The markings in the month of May took place on May 7th, 16th, and 17th, considerably nearer the coast than those in March, as the fishery at this time of the year approached coastal waters; they have not been considered in detail in this paper, because a large percentage of the cod were immature and several of the large specimens may have been spent migrants from the more northerly spawning areas of the "Nordhavet". A few details will be mentioned below, but Strubberg (1933 pp. 22—27) has already dealt at length with this material; on pages 25—26, he mentions the March experiments included here, these being of special value when related to later markings in these waters.

Out of 199 cod marked during March 1927, only 26 have been recaptured (13.1 %); eliminating those of less than 70 cm. in length, 157 are left for consideration, 24 of which were recaptured (15.3 %).

The recaptures have been recorded as follows:

Liberated March	1927	199
Recaptured	1927	19[1])
—	1928	5
—	1929	2

Details appear in the tables 4a—c.

From the charts, figs. 6 and 7, it will be noticed, that

a) Cod of more than 70 cm. in length during the period April—October have dispersed from the marking localities over the banks.

[1]) 2 < 70 cm. at liberation.

Fig. 6. Marking experiment March 1927. Dispersal of large cod during April—October of the marking-year. IV: recaptured in April; V: in May etc.

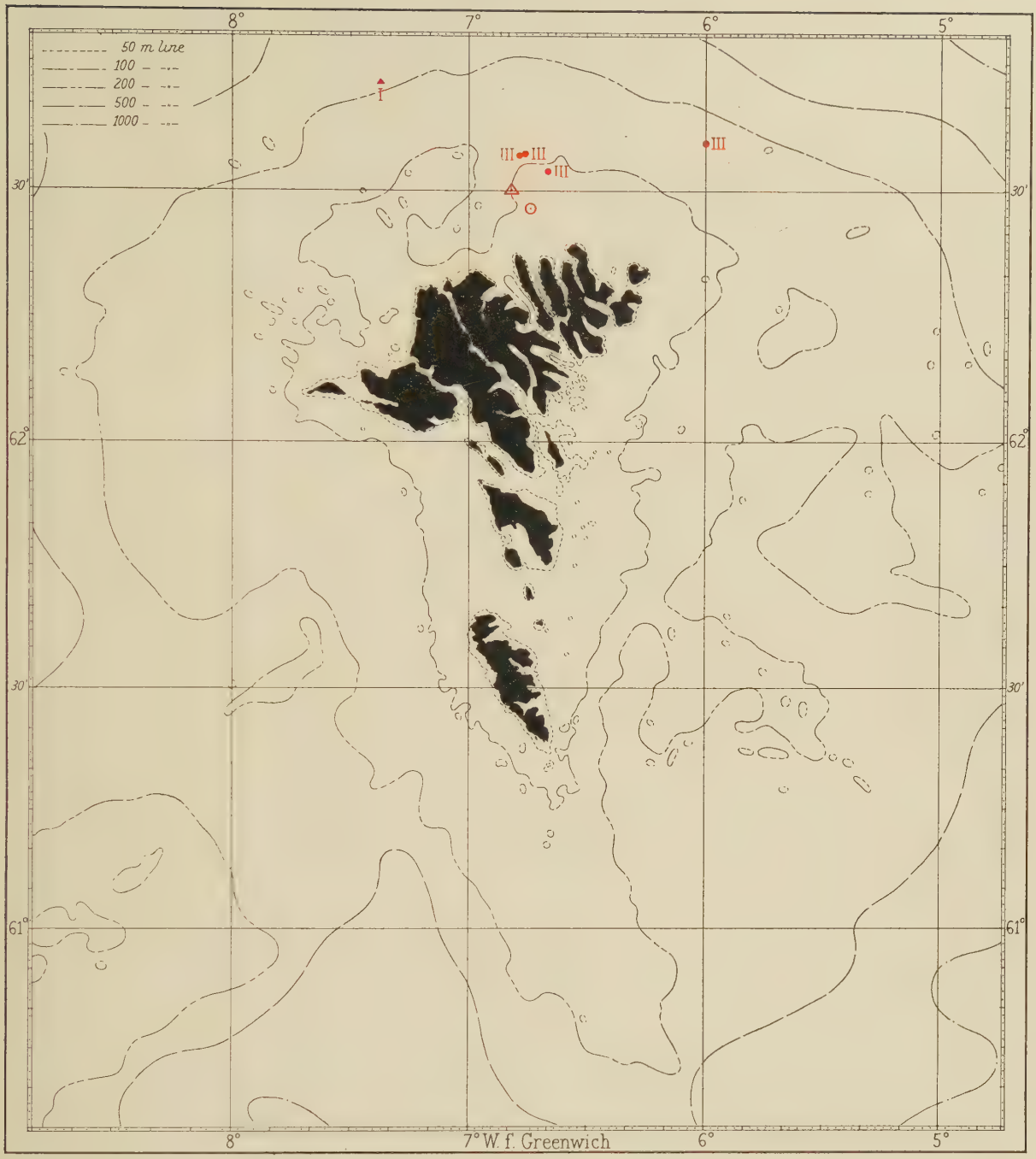

Fig. 7. Marking experiment March 1927. Localities of recaptured large cod during January—May of the year succeeding the marking-year. I: recaptured in January, II: in February etc.

A single record exists of a specimen which has left the Faroe waters; it was caught in June by a Hull trawler in the northern North Sea some 350 miles from the marking locality. As already mentioned in the introduction it rarely happens that Faroe cod leaves the home-waters, and reports on captures outside these waters, therefore, must be accepted with reserve; the above record seems, however, to be perfectly correct.

From the chart (and Table 4a) it appears that a couple of individuals were recaptured during April near the places of marking, while none were caught here between May and November. From Table 4c it appears that a single individual less than 70 cm. (actual length 61 cm.) was recaptured near the place of marking in May. For two individuals the place of recapture is not known, but they might have been caught near the marking localities also.

During the months May to August trawlers work everywhere around the islands and recaptures are recorded, therefore, from widely distributed positions on the banks; a majority of recaptures are recorded from the Myggenæs-area, none in southwest or south, where recaptures in other years are comparatively numerous.

b) A study of the localities of recaptures of cod, more than 70 cm. in length when marked, during the period January to May of the year following the year of marking shows by chart Fig. 7 that all (5) are recorded from the "Nordhavet", and three actually close to the original marking locality. Assuming that the specimen recorded far to the northwest in January had actually been captured more southwesterly (see note to Table 4b) it would still be within the "Nordhavet" and all recaptures may accordingly be considered cases of return to, or near to, the spawning area.

Table 4c records a few individuals that cannot be included within the two above categories; one of them (No. 4124) was recaught near Myggenæs in December of the year of marking and probably this specimen was *en route* back to the spawning grounds north of the islands.

Two individuals were recaught in 1929, both during the spawning period in the month of March and both near the marking locality. Both are of interest primarily because it is rather unusual to get any recaptures of large cod at the Faroes so late after marking (the present material contains but 0.7 % of this category), secondly because these recaptures confirm the idea that mature cod in successive years return to the same or nearly the same locality in order to spawn.

The experiment made northeast of Viderø on May 7th, 1927 (62°22.7′ N., 6°27.5′ W., see Strubberg, 1933, pp. 26—27) includes but 41 individuals, 16 of which exceeded 70 cm. in length; 14 (and 5 respectively) were recaptured, mostly north of the islands and shortly after marking, two were caught later in the year, one near Myggenæs and one southwest of Munken. Two only remained a longer period in the sea, one until next year and one to the third year; they were recaught within the "Nordhavet" in March and April respectively.

The experiment of May the 16th—17th (see Strubberg, 1933, pp. 22—23) near the coast at Myling Head undoubtedly was made, to a certain extent, on cod migrating from the spawning grounds. Recaptures (30 out of 142) are recorded partly from positions near the place of marking, partly from localities dispersed all over the banks round the islands. Three (> 70 cm.) were recaptured in Febr.—April the year after—or the second year after—in the "Nordhavet". This experiment—together with that just mentioned—confirms the results of the experiments made within the spawning period proper, but will not be the subject of detailed description here.

Table 4a. Cod recaptured during spring and summer in the year of marking, 1927 (all specimens > 70 cm. initial length).

Liberation: Locality		Date and year	No. on label	Recapture: Locality[1]		Date and year	No. of months in the Sea	Init. & ultimate size	Sex[2]	Age-group	Fishing vessel[3]
62°30′ N.	6°49′ W.	26/3 27	4135	62°30′ N.	7°00′ W.	6/4 27	1/3	80—83	♂	VI	S
62°27.5′	6°44.5′	17/3 -	4069	c.62°27.5′	6°44.5′	19/4 -	1	84— ?	..	..	F
62°27.5′	6°44.5′	— -	4051	c.62°09.5′	6°32′	15/5 -	2	81— ?	..	..	F
62°30′	6°49′	26/3 -	4165	c.61°54′	8°00′	4/6 -	2 1/4	81—83.2	..	..	F
—	—	— -	4149	59°10′	3°45′ E.	10/6 -	2 1/2	75—76.7	..	VI	E
—	—	— -	4112	c.62°10′	8°03′ W.	20/6 -	3	80—82.8	♂	V	S
62°27.5′	6°44.5′	25/3 -	4080	c.62°06.5′	7°05′	20/6 -	3	86— ?	..	..	F
62°30′	6°49′	26/3 -	4099	62°16′	7°26′	22/6 -	3	72— ?	..	..	E
—	—	— -	4102	61°29′	6°03′	23/6 -	3	84— ?	..	..	F
62°27.5′	6°44.5′	17/3 -	4063	c.62°10′	8°03′	29/6 -	3 1/3	80—84.5	♂	VI	S
—		— -	4018	c.61°47′	6°52′	1/7 -	3 1/2	76— ?	..	..	F
—	—	— -	4020	c.61°41′	6°47′	2/7 -	3 1/2	82— ?	..	..	F
62°30′	6°49′	26/3 -	4107	c.62°17′	8°15′	6/8 -	4 1/3	85—88	♂	VI	S
62°27.5′	6°44.5′	17/3 -	4032	62°20′	6°23′	24/8 -	5 1/4	85—87	..	..	F
62°30′	6°49′	26/3 -	4164	c.62°35′	6°00′	25/8 -	5	79—81.5	..	V	S

[1]) "c." indicates that position is not given directly by fishermen, bearings only recorded.
[2]) Sex determined when recaptured; given here with all reserve.
[3]) Fishing vessel: F = Faroe, E = England, S = Scotland, N = Norway.

Abbreviations used in all tables of recaptures.

Table 4 b. Cod recaptured during the spawning period of the year after the marking year (all specimens > 70 cm. initial length).

Liberation: Locality		Date and year	No. on label	Recapture: Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°30′ N.	6°49′ W.	26/3 27	4130	c.62°43′ N.	7°22′ W.[1])	18/1 28	9 3/4	85—92	..	VII	S
62°27.5′	6°44.5′	17/3 -	4047	c.62°34′	6°47′	?/3 -	12	87— ?	..	..	F
-	—	— -	4065	—	—	9/3 -	12	84— ?	♂	..	F
		— -	4009	c.62°32′	6°40′	12/3 -	12	75—81	..	..	F
—	- -	— -	4017	c.62°35′	6°00′	24/3 -	12	72—74.5	..	VI	E

[1]) Fishing also carried out 20 miles NNW. of Myggenæs; the position is, however, presumed correct for the cod in question.

Table 4 c. Other recaptures of cod from the experiment of 1927.

Liberation: Locality		Date and year	No. on label	Recapture: Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°27.5′ N.	6°44.5′ W.	17/3 27	4072	"Nordhavet"		29/3 27	1/3	57— ?	..	..	F
62°30′	6°49′	26/3 -	4121	c.62°29′ N.	6°54′ W.	5/5 -	1 1/3	61—61	..	..	F
—	—	— -	4098	?	?	Spring -	<3	94— ?	..	..	?
—	—	— -	4124	c.62°06′	7°55′	5/12 -	8 1/3	74—75.7	..	V	E
—	—	— -	4096	62°31′	6°45′	8/3 29	23 1/3	79— ?	..	..	F
62°27.5′	6°44.5′	17/3 -	4066	62°35′	6°42′	13/3 -	24	81— ?	..	..	F

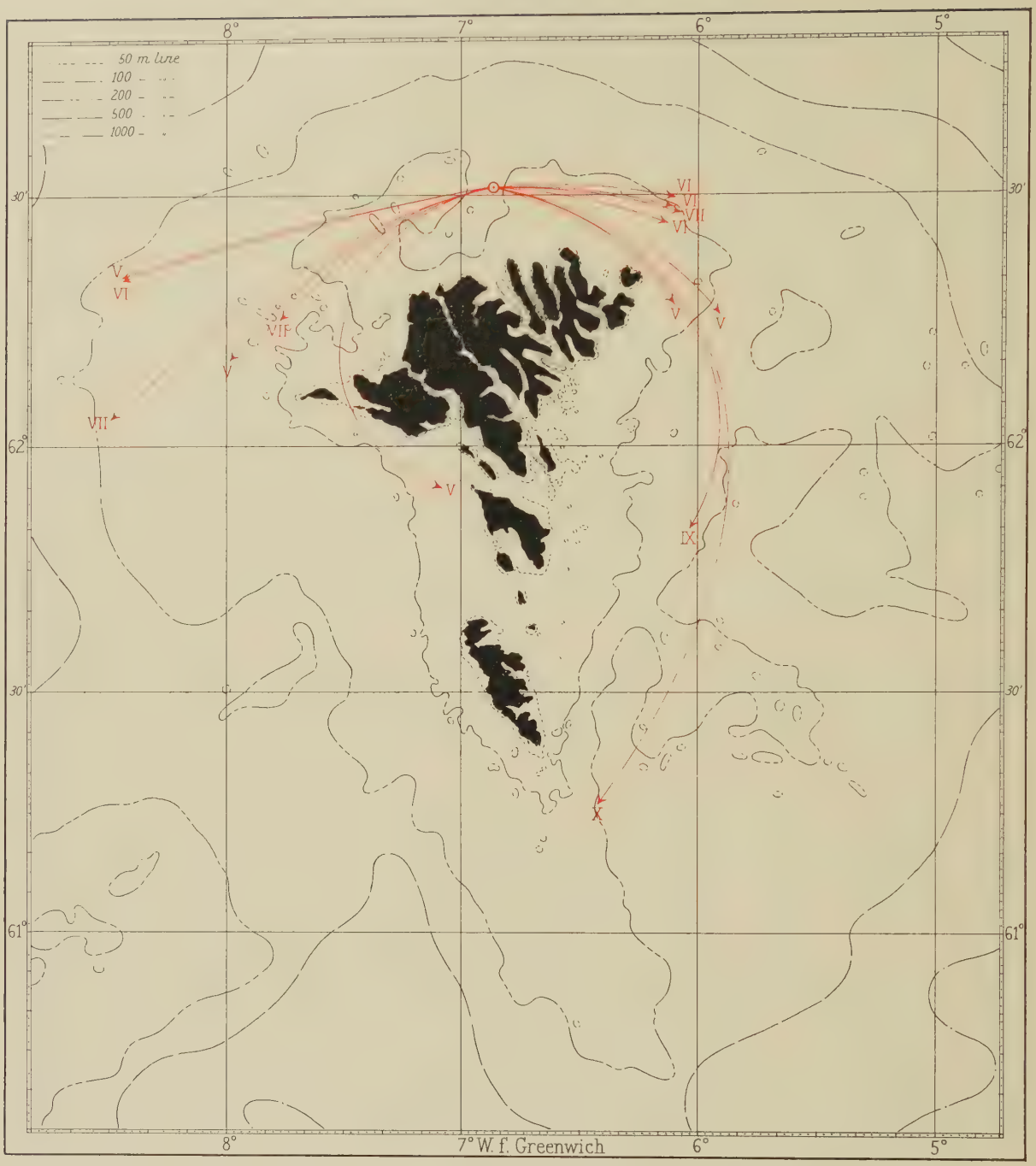

Fig. 8. Marking experiment April 1932. Dispersal of large cod during May—October of the marking-year. V: recaptured in May; VI: in June etc.

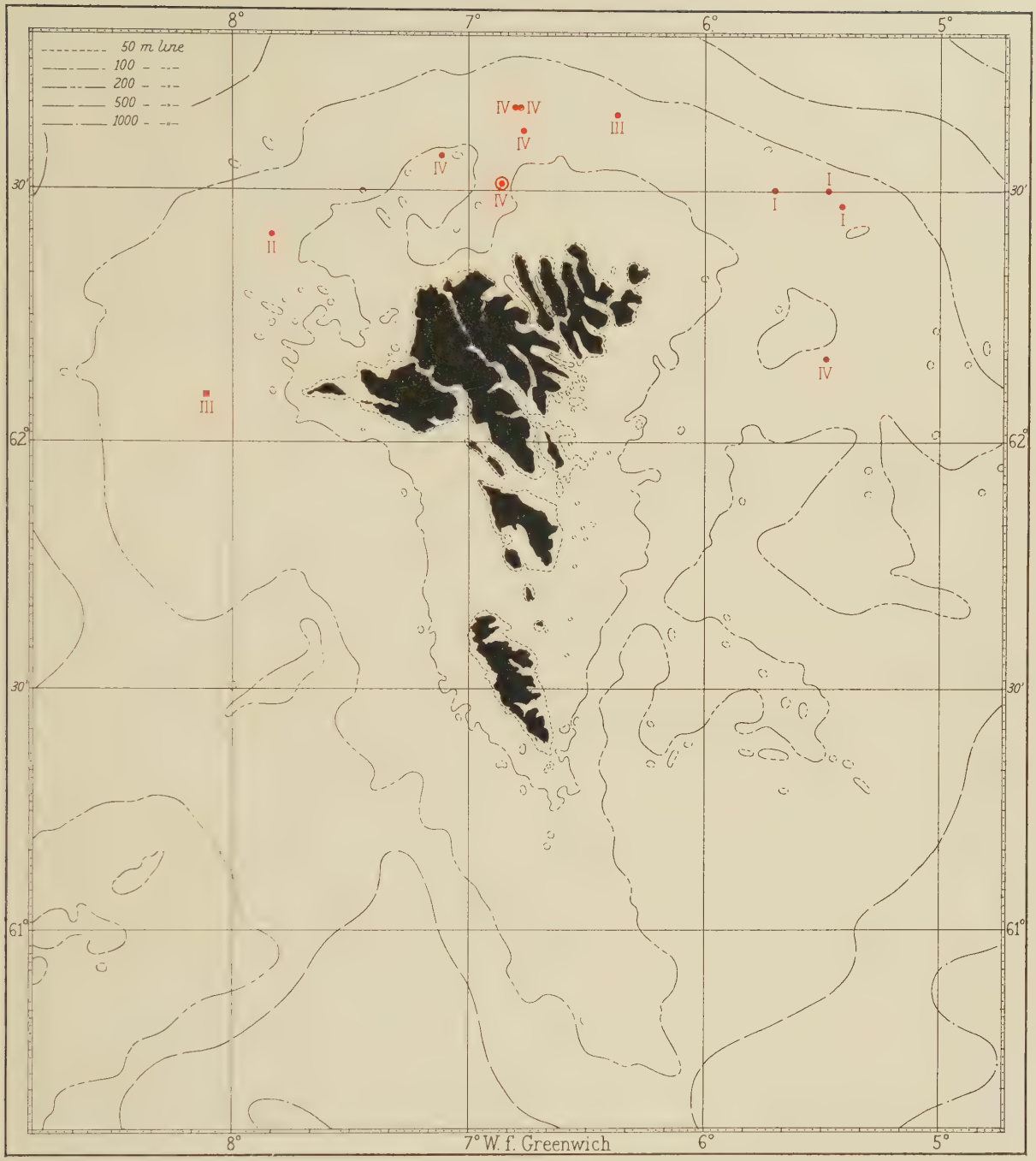

Fig. 9. Marking experiment April 1932. Localities of recaptured large cod during January—May of the year succeeding the marking-year. I: recaptured in January; II: in February etc.

2. Experiments 1932. This year 226 cod were marked in the "Nordhavet", 164 in April, and 62 in May; the latter experiment was carried out towards the close of the spawning season, and recaptures from this will be subject to a less detailed discussion here. All cod marked were above 70 cm. in length.

The experiments are mentioned without further details by STRUBBERG (l. c. 1933, p. 27) being not yet concluded when he published the work in question.

Of the cod marked in April, 32 out of 164 were recaptured, and in respect of the May-markings: 13 out of 62. The percentages are 19.5 and 21 respectively.

The recaptures have been recorded as follows:

		April-experiment	May-experiment
Liberated	1932	164	62
Recaptured	1932	17	10
—	1933	15	1
—	1934	0	2

As to details: see Tables 5 a—c and 6.

The charts, figs. 8 and 9, pp. 14—15, record migrations of cod marked in April. No chart has been drawn in respect of the small May-experiment. It will now be seen from figs. 8 and 9 that:

a) Cod above the 70 cm. limit when marked during the following months, May—October, have dispersed from the marking locality particularly to the banks southeast and northeast of Fuglø, but also to the banks west and northwest of Myggenæs; a few have migrated further south, one is recorded south of Suderø even, where it was caught in October.

On the banks off Fuglø and Myggenæs all recaptures are recorded during May, June and July. The two more southerly records, however, are from September and October. This experiment does not record any recaptures north of the islands where marking took place and where trawlers are working during the summer also; it seems justified, then, to assume that very few specimens have remained within this area after spawning. From Table 5 c it appears that a single recapture was made late in the year (December) off Myggenæs. The table also records two specimens caught in 1932 with insufficient data as to place of recapture, and accordingly excluded from the chart.

b) Studying recaptures of cod (> 70 cm. at marking) during the period January—May of the year following the year of marking the chart fig. 9 shows that the majority are recorded within the "Nordhavet", 6 have been taken near the places of marking, 4 at some distance off Fuglø, and 2 in the Myggenæs area. Further it will be noticed that recaptures near the marking places (the spawning area) have all been recorded during April, with one exception only (March), while those recaptured at some distance from this are distributed as follows: 3 in January, 1 in February, 1 in March and 1 in April. This fact tells us that most of these recaptures are from the early part of the spawning season and these cod might accordingly easily have reached the spawning grounds by April to participate in the spawning. It will be seen that no recapture is recorded in the southern areas.

From Table 5 c it appears that another 3 recaptures (July, October and December) are recorded during 1933; these confirm the general dispersal in east and west after spawning. No recapture has been recorded in the third year.

Table 5 a. Cod recaptured during spring and summer in the year of marking, 1932 (all specimens > 70 cm. initial length). Experiment of April 1932.

Liberation				Recapture							
Locality		Date and year	No. on label	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°31′ N.	6°52′ W.	18/4 32	14684	c.62°17′ N.	6°06′ W.	16/5 32	1	74—75	..	IV	S
—	—	– -	14666	61°55′	7°05′	25/5 -	1 1/4	79—80	..	V	E
—	—	29/4 -	14808	62°10′	8°00′	— -	3/4	80—83.6	..	V	E
—	—	— -	14811	c.62°16′	5°55′	29/5 -	1	84—86.8	♂	VIII?	S
—	—	-	14794	c.62°20′	8°27′	30/5 -	1	75— ?	..	..	E
—	—	– -	14786	c.62°30′	6°06′	4/6 -	1	86—87.5	..	VI	S
—	—	-	14699	62°20′	8°27′	12/6 -	1 1/2	72 -73.1	..	V	E
—	—	– -	14789	c.62°29′	6°07′	13/6 -	1 1/2	77—78.5	♂	IV	S
—	—	— -	14717	c.62°27′	6°08′	17/6 -	1 1/2	79—81.5	♂	V	S
—	—	-	14799	c.62°28′	6°05′	13/7 -	2 1/2	82—83.7	..	V	S
—	—	-	14745	62°03′	8°30′	20/7 -	2 2/3	78— ?	..	..	E
—	—	-	14743	c.62°15′	7°47′	23/7 -	2 3/4	90—93.2	..	VII?	S
—	—	-	14793	c.61°50′	6°02′	5/9 -	4	80—80.7	..	V	S
—	—	-	14730	c.61°16′	6°25′	22/10 -	5 3/4	83—84.2	♂	V?	S

Table 5 b. Cod recaptured during the spawning period of the year after the marking-year (all specimens > 70 cm. initial length). Experiment of April 1932.

Liberation				Recapture							
62°31′ N.	6°52′ W.	29/4 32	14775	c.62°30′ N.	5°29′ W.	24/1 33	8 3/4	75—77.2	..	V	S
—	—	— -	14711	c.62°30′	5°42′	27/1 -	9	85—93	..	VII	S
—	—	– -	14695	c.62°28′	5°25′	29/1 -	9	90—92.7	..	VII	S
—	—	— -	14708	c.62°25′	7°50′	6/2 -	9 1/4	86—88.8	♂[1])	VIII?	S
—	—	18/4 -	14675	c.62°06′	8°07′	1/3 -	10 1/2	91—95	..	VII	S
—	—	29/4 -	14766	c.62°39′	6°22′	24/3 -	11	71—75	..	V	S
—	—	-	14739	62°10′	5°30′	2/4 -	11	75— ?	..	..	E
—	—	-	14765	62°31′	6°52′	4/4 -	11 1/4	81—83	..	VI	F
—	—	-	14782	c.62°34′	7°07′	18/4 -	11 2/3	83—87.5	♂	VI	S
—	—	-	14809	c.62°40′	6°48′	20/4 -	11 2/3	85— ?	..	..	E
—	—	-	14712	62°40′	6°47′	21/4 -	11 3/4	88—89	♀	VIII	F
—	—	-	14706	62°37′	6°46′	21/4 -	11 3/4	76—80	♀	V	F

[1]) Maturity VII.

Table 5 c. Other recaptures of cod from the experiment of April 1932.

Liberation				Recapture							
62°31′ N.	6°52′ W.	18/4 32	14682	?	?	Spring 32	<2 1/2	96— ?	..	..	?
—	—	29/4 -	14698	?	?	Oct. -	c.5 3/4	83—87	..	VI	S
—	—	18/4 -	14689	c.62°07′ N.	8°24′ W.	7/12 -	7 2/3	91—93.6	..	VII?	S
—	—	— -	14657	62°05′	8°00′	2/7 33	14 1/2	71— ?	..	..	E
—	—	29/4 -	14734	62°08′	5°20′	15/10 -	17 1/2	73— ?	..	..	E
—	—	— -	14747	62°10′	5°25′	2/12 -	19	94— ?	..	..	E

The marking experiment of May, 1932 (Table 6).

As previously stated spawning at the Faroes may extend into May, even lasting until the end of May, and slight spawning has been observed occasionally at still later dates.

The present experiment was undertaken in a year when spawning fish were rather plentiful on "Vaargrunden" after the middle of May. Marking took place on May 18th, but only 62 individuals were liberated, 13 of which have been recaptured. The experiment being a minor one it has not been considered of any interest to give a chart of the migrations. It is of interest, however, that the results fully correspond with those of experiments made earlier in the season (March—April)[1]) viz.:

a) Dispersal after the spawning to the east and west as well as to the south during May—October (7 recaptures) in which period none were caught nearer than 20 nautical miles from the place of marking.

b) During the following year one was caught during the spawning period (April, 1933) close to the place of liberation in the previous year.

From Table 6 it appears that two recaptures were made in the third year (March—April, 1934), both in the northern Faroe-district, although outside the immediate neighbourhood of the marking locality. Obviously it is impossible to state whether these individuals would have approached the spawning grounds or not; they might be even spent emigrants. As previously stated we may stress that recaptures in the third year are rather scarce.

Table 6. All recaptures of cod from the experiment of May 1932.

Liberation				Recapture							
Locality		Date and year	No. on label	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°31′ N.	6°52′ W.	$^{18}/_{5}$ 32	14868	c.62°06′ N.	6°16′ W.	$^{30}/_{5}$ 32	$^{1}/_{2}$	97—99.5	..	VIII	S
—	—	— -	14849	61°40′	7°47′	$^{10}/_{6}$ -	1	75—76.1	..	VI?	E
62°34′	6°49′	— -	14819	62°10′	7°55′	$^{14}/_{6}$ -	1	89— ?	..	..	E
62°31′	6°52′	— -	14850	c.62°14′	7°40′	$^{11}/_{7}$ -	2	80— ?	..	..	E
—	—	— -	14857	c.62°22′	6°12′	$^{28}/_{7}$ -	$2^{1}/_{3}$	72— ?	..	..	E
—	—	— -	14845	?	?	Summer -	<3	100— ?	..	..	?
62°34′	6°49′	— -	14823	c.62°22′	7°19′	$^{4}/_{8}$ -	$2^{1}/_{2}$	70—70.9	..	V	E
—	—	— -	14839	62°06.5′	6°52′	$^{13}/_{9}$ -	4	71—71	..	..	F
—	—	— -	14834	62°31′	6°55′	$^{15}/_{11}$ -	6	75—76	♂	VII	F
62°31′	6°52′	— -	14842	c.62°19′	8°06′	$^{21}/_{11}$ -	6	88—92.6	..	VII	S
	—	— -	14873	62°32′	6°54′	$^{19}/_{4}$ 33	11	81—83	♂	VII	F
—	—	— -	14860	c.62°27′	8°12′	$^{22}/_{3}$ 34	22	95—99.3	..	VIII	S
—	—	— -	14872	c.62°18′	5°25′	$^{21}/_{4}$ -	23	91— ?	..	..	E

3. Experiment 1934. This year the number of cod marked was very low, 14 only. The marking took place towards the end of the spawning season when the "Dana" happened to pass the locality. All but one were above the 70 cm. limit and 3 were recaptured before the

[1]) Compare experiment near Myling Head, May 1927, see above p. 12, and Strubberg, 1933, p. 22 et seq.

end of the year, in July, August and December. One was caught west of Myggenæs, two east of the islands, and the migrations confirm the dispersal from the spawning ground, to the east as well as to the west, shown by other experiments. A chart showing these migrations has not been considered necessary as the particulars of the 3 recaptures are given in the following table (Table 7).

Table 7. Recaptures of cod from the experiment of 1934.

Liberation				Recapture							
Locality		Date and year	No. on label	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°30′ N.	6°50′ W.	$^{28}/_{4}$ 34	2003	c.62°11′ N.	8°12′ W.	$^{2}/_{7}$ 34	2	107— ?	..	VII	S
—	—	— -	2005	62°02′	4°26′	$^{10}/_{8}$ -	$3^{1}/_{3}$	82— ?	..	..	N
—	—	— -	2007	c.62°24′	5°31′	$^{24}/_{12}$ -	8	87— ?	..	..	S

4. Experiments 1935. Between March 30th and April 13th, 1935, 244 cod were marked. On March 30th, 35 cod were marked at a more westerly position than usually chosen during the period 1927—37. Otherwise the markings of the year were all made (April 8th—13th) at the usual locality, the majority being above the 70 cm. limit, 13 only below.

A total of 46 individuals—or 18.9 %—were recaptured (43 out of 231 > 70 cm. or 18.6 %).

The recaptures have been recorded as follows:

Liberated	1935	244
Recaptured	1935	40
—	1936	4
—	1937	1
—	1938	0
—	1939	1

Details appear in the Tables 8 a—c.

The charts figs. 10 and 11, pp. 20—21, illustrate the migrations of the categories of cod specially dealt with in this report.

a) Cod of more than 70 cm. in length at marking disperse during the following months—April to October—east and west of the islands.

It will be noticed that only one single specimen was caught near the place of liberation during the period considered and it had been at liberty for fourteen days only (marked $^{13}/_{4}$, recaught $^{27}/_{4}$). One had travelled as far as the Faroe Bank where it was caught early in July; this is a rare, not to say exceptional, record, as migrations between the two areas—the Faroe Bank and the Faroe-waters proper—are but rarely recorded. A noticeable feature of this experiment is the marked scarcity of recaptures from the southernmost waters, most recaptures being from the banks round Myggenæs. The migration has, according to the recaptures, mainly been directed westwards, 5 records only in the Fuglø area as against 18 in the Myggenæs area[1]). 19 out of the 30 coming into the category under discussion were caught during May and June, 2 or 3 only in each of the months July, August and September.

[1]) 2 with insufficient details as to locality of recapture have been recorded in Table 8c; these might have to be added either to the east or to the west group.

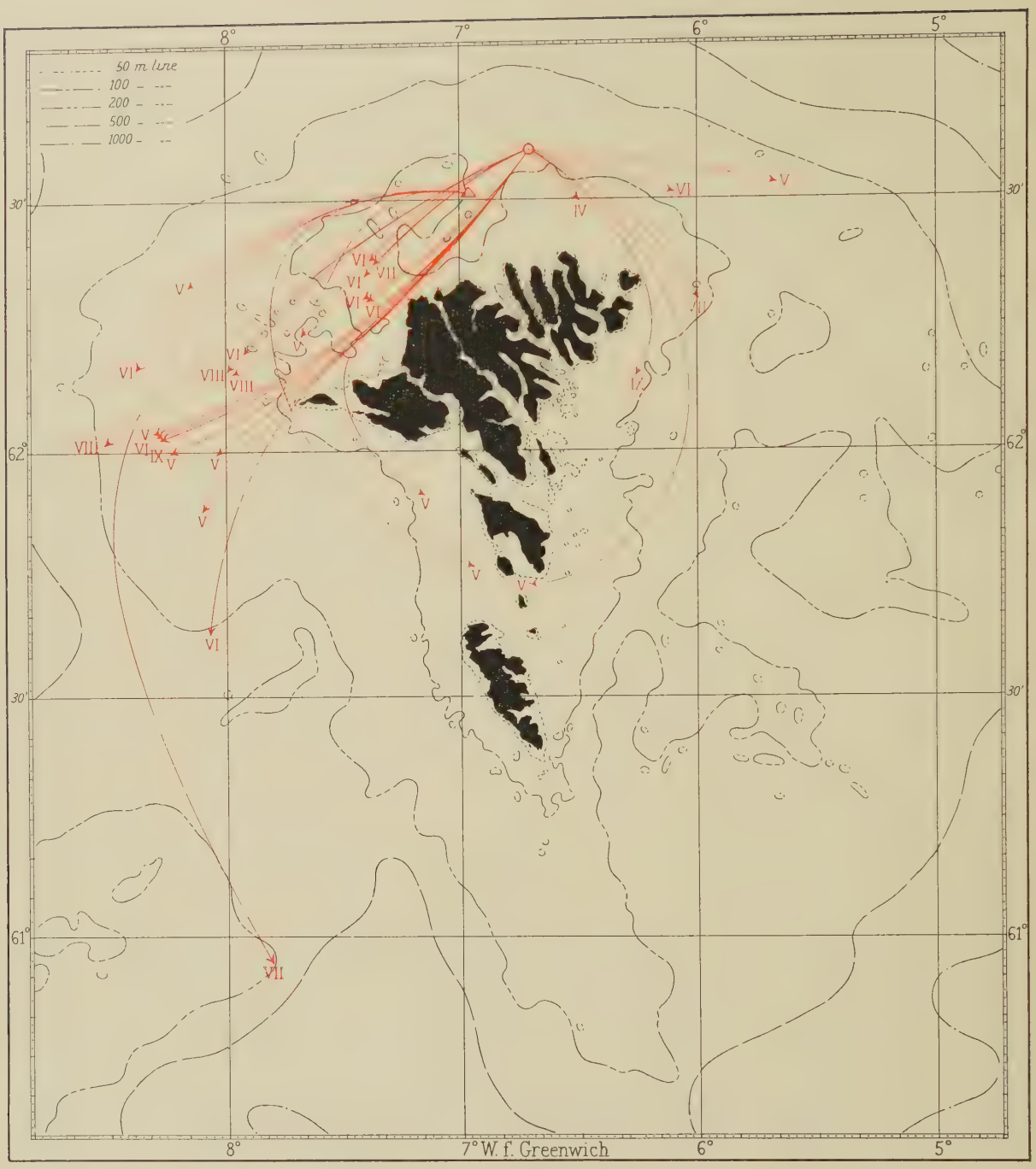

Fig. 10. Marking experiment March—April 1935. Dispersal of large cod during April—October of the marking-year. IV: recaptured in April, V: in May etc.

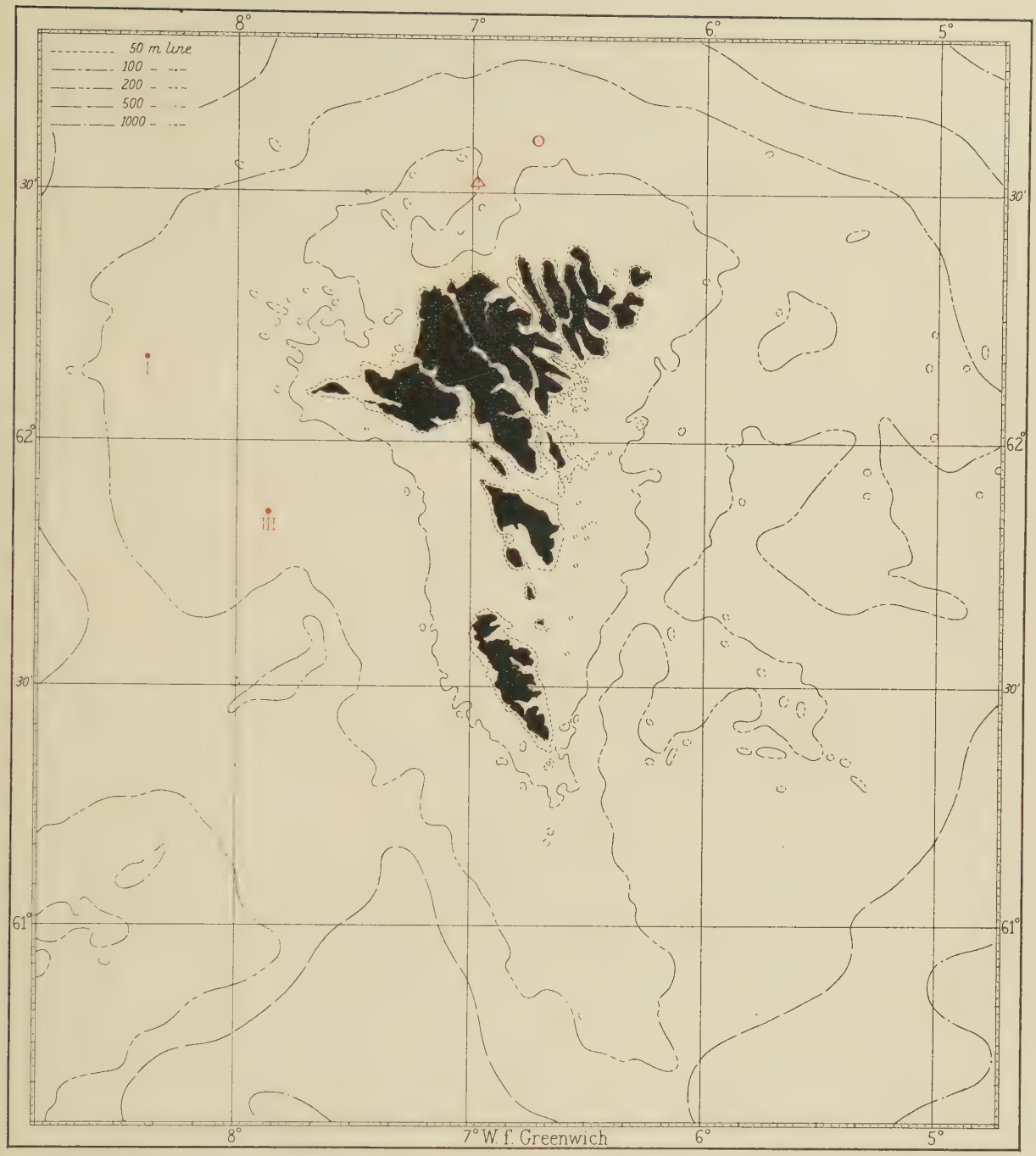

Fig. 11. Marking experiment March—April 1935. Localities of recaptured large cod during January—May of the year succeeding the marking-year. I: recaptured in January, II: in February etc.

No recapture took place in October, while November—December record a total of 7, dispersed on the banks in east, south and west (see Table 8c). Finally the table shows that 3 specimens of 66—67 cm. length at marking were recaught in May, June and August of the marking year (1935), 2 in the Fuglo area, 1 west of the Sudero; the latter comparatively long migration indicates that this specimen had been spawning when marked, as immature fish rarely seem to undertake migrations of such length.

b) Studying the migrations of cod (> 70 cm. when marked) recaptured within the period January to May of the following year (1936), the experiment gives an exceptionally poor result, 2 specimens only being recaptured in this period, one in January, the other on the 1st of March, and both west of the islands (see Table 8b).

Information obtained on the fishery north of the Faroes in this particular year (1936), shows that the spring fishery was exceptionally poor at the "Nordhavet".

Table 8 a. Cod recaptured during spring and summer in the year of marking, 1935 (all specimens > 70 cm. initial length).

Liberation				Recapture						
Locality		Date and year	No. on label	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°36′ N.	6°43′ W.	13/4 35	2547	c.62°30′ N.	6°30′ W.	27/4 35	1/2	100—?	♂	..	E
—	—	— -	2584	c.62°00′	8°03′	?/5 -	c.1	78—?	..	..	E
—	—	8/4 -	2453	c.61°44′	6°44′	6/5 -	1	80—?	..	..	E
—	—	13/4 -	2595	c.62°02′	8°18′	14/5 -	1	101—?	..	..	E
62°31′	6°58′	30/3 -	2424	62°20′	8°10′	15/5 -	1 1/2	86—?	..	..	E
62°36′	6°43′	13/4 -	2585	c.62°32′	5°40′	21/5 -	1 1/4	83—85	..	VI?	S
—	—	9/4 -	2523	c.61°53′	8°07′	23/5 -	1 1/2	89—90.7	..	XIII[1])	S
—	—	13/4 -	2606	62°00′	8°15′	25/5 -	1 1/2	85—?	..	..	E
—	—	9/4 -	2492	c.62°14′	7°41′	29/5 -	1 2/3	85—87	♀[2])	VI	S
—	—	8/4 -	2466	61°55′	7°10′	30/5 -	1 3/4	71—71.1	..	V	E
62°31′	6°58′	30/3 -	2404	c.61°46′	6°58′	30/5 -	2	76—?	..	..	E
62°36′	6°43′	8/4 -	2451	c.62°12′	7°56′	1/6 -	1 3/4	83—?	♂	..	E
—	—	13/4 -	2576	62°02′	8°18′	8/6 -	2	86—?	..	..	E
—	—	9/4 -	2525	c.62°21′	7°25′	11/6 -	2	80—?	..	..	E
—	—	— -	2507	c.62°23′	7°24′	13/6 -	2	79—81.5	..	V	S
—	—	— -	2515	c.62°18′	7°25′	23/6 -	2 1/2	90—90.4	..	VII?	S
—	—	13/4 -	2537	—	—	23/6 -	2 1/3	76—76.5	..	IV	S
—	—	— -	2570	c.62°31′	6°06′	27/6 -	2 1/2	101—101.7	♂[3])	VIII	S
—	—	— -	2588	c.61°38′	8°05′	29/6 -	2 1/2	74—?	♂[3])	V?	S
62°31′	6°58′	30/3 -	2408	c.62°10′	8°24′	30/6 -	3	75—?	♂	..	E
—	—	— -	2420	c.60°57′	7°50′	6/7 -	3 1/4	72—?	..	..	E
62°36′	6°43′	13/4 -	2618	c.62°23′	7°24′	11/7 -	3	74—75	..	V?	S
—	—	— -	2620	c.62°18′	6°00′	18/7 -	3	89—?	..	..	E
—	—	— -	2566	c.62°01′	8°32′	c.15/8 -	c.4	82—82.1	..	VI?	S
62°31′	6°58′	30/3 -	2421	c.62°10′	8°00′	18/8 -	4 1/2	91—?	..	..	E
62°36′	6°43′	13/4 -	2556	c.62°10′	8°00′	— -	4	82—?	..	..	E
—	—	8/4 -	2472	62°02′	8°18′	6/9 -	5	76—?	..	..	E
—	—	— -	2475	c.62°09′	6°16′	15/9 -	5 1/4	83—87	♂	VI	S

[1]) The specimen in question of northern origin (Iceland?) according to structure of otolith.

[2]) Recovering spent.

[3]) Spent.

Table 8 b. Cod recaptured during the spawning period of the year after the marking-year (all specimens > 70 cm. initial length).

Liberation				Recapture						
Locality		Date and year	No. on label	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°36′ N.	6°43′ W.	$^{8}/_{4}$ 35	2454	c.62°10′ N.	8°22′ W.	$^{17}/_{1}$ 36	$9^{1}/_{4}$	77—83	♂[1])	VI	S
—	—	$^{13}/_{4}$ -	2610	c.61°51′	7°52′	$^{1}/_{3}$ -	$10^{1}/_{2}$	96—105.7	..	VII?	S

[1]) Maturity VI.

Table 8 c. Other recaptures of cod from the experiment of 1935.

Liberation				Recapture							
Locality		Date and year	No. on label	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°31′ N.	6°58′ W.	$^{30}/_{3}$ 35	2415	61°50′ N.	7°00′ W.	$^{6}/_{5}$ 35	$1^{1}/_{4}$	67—?	..	..	E
62°36′	6°43′	$^{9}/_{4}$ -	2519	?	?	Spring -	<2	79—?	..	..	?
62°31′	6°58′	$^{30}/_{3}$ -	2402	c.62°16′	5°58′	$^{24}/_{6}$ -	$2^{3}/_{4}$	66—67	..	IV	S
62°36′	6°43′	$^{13}/_{4}$ -	2538	?	?	c.$^{1}/_{8}$ -	c.$3^{1}/_{2}$	78—?	..	V	S
—	—	$^{8}/_{4}$ -	2467	c.62°05′	6°13′	$^{16}/_{8}$ -	$4^{1}/_{4}$	66—66.6	..	IV?	S
—	—	$^{13}/_{4}$ -	2558	c.61°23′	7°28′	$^{7}/_{11}$ -	$6^{3}/_{4}$	81—81.8	♂	VII?	S
—	—	$^{9}/_{4}$ -	2526	c.61°15′	7°05′	$^{11}/_{11}$ -	7	89—?	..	..	E
—	—	— -	2499	c.61°50′	8°14′	$^{1}/_{12}$ -	$7^{2}/_{3}$	86—87.4	..	VII	S
—	—	$^{8}/_{4}$ -	2440	c.62°22′	5°38′	c.$^{1}/_{12}$ -	c.$7^{2}/_{3}$	100—102	..	VIII?	S
—	—	$^{13}/_{4}$ -	2559	c.62°09′	8°35′	$^{15}/_{12}$ -	8	86—90.4	..	VII	S
62°31′	6°58′	$^{30}/_{3}$ -	2409	c.62°09′	8°35′	$^{15}/_{12}$ -	$8^{1}/_{2}$	85—90	..	VI?	S
—	—	— -	2422	c.62°15′	8°43′	$^{26}/_{12}$ -	9	87—?	..	..	S
62°36′	6°43′	$^{13}/_{4}$ -	2541	c.62°07.5′	7°48′	$^{4}/_{6}$ 36	$13^{2}/_{3}$	84—92	♂	VI?	F
—	—	$^{8}/_{4}$ -	2438	c.61°37′	6°27′	$^{1}/_{11}$ -	$18^{3}/_{4}$	75—?	..	..	E
62°31′	6°58′	$^{30}/_{3}$ -	2435	c.62°24′	6°05′	$^{13}/_{3}$ 37	$23^{1}/_{2}$	72—93.5	..	VII?	S
62°36′	6°43′	$^{8}/_{4}$ -	2471	62°28′	6°50′	$^{11}/_{4}$ 39	48	79—89	♀	VIII	F

According to data received from a motor cutter that usually works in this area, it appears that the catch of 1936 was 2 tons only as against an average of 13 tons of gutted fish without head for the period 1927—38; also, the catch per 1000 hooks is recorded by other motor-boats as very poor in 1936, e.g., 30—40 specimens as against 70—80 to be considered a satisfactory catch in this district.

Later in the year (1936) 2 recaptures were recorded, one near Myggenæs in June and one east of Suderø in November, both again confirming the general dispersal recorded in other experiments.

The third year (1937) records a single recapture, March 13th off Fuglø, viz., some 20 miles only from the most important spawning ground in the "Nordhavet", a distance no longer than is easily travelled by a migrating cod in 24 hours (Table 8c).

The experiment under review shows moreover a very rare record of a cod recaptured in the fifth year (1939). The specimen is recorded as spawning when caught on April 11th 1939 (it was marked on April 8th 1935), and the positions of liberation and recapture were but a few miles apart. In other words, this cod has returned in the fifth spring to the same place; judging from its size (79 cm. when marked, 89 cm. when recaptured) and from the structure of the otolith there can be no doubt as to the question of spawning on both occasions and the years between; it was 8 years old when recaptured (see Table 8c).

5. Experiments 1937. The marking experiments 1927 –1935 had given but few recaptures during the spring following the marking year. It was accordingly of importance to get more numerous records, and we arranged therefore, in 1937, a more extensive marking experiment comprising 411 cod all of which measured more than 70 cm. in length. We got more records than in previous experiments, but the recapture percentage of the second year, however, was less than that of 1932.

The markings were carried out at three localities within the most important fishing grounds for spawning cod of the year; on April 3rd—6th, April 9th, and April 15th—16th. During spawning the cod as usual was approaching the coast; accordingly the first marking took place further away from the coast, the latter nearer the coast (see charts figs. 12—13).

At present the records contain 69 recaptures (out of 411 marked) or 16.8 % distributed as to years as follows:

Liberated	1937	411
Recaptured	1937	56
—	1938	11
—	1939	2

The particulars may be seen from Tables 9 a—c. The charts figs. 12 and 13, pp. 26–27, give a survey of the migrations.

a) The cod—all > 70 cm. in length when marked—have dispersed from the marking localities to the banks east and west of the islands during April to October; also as far south as the waters south of Suderø.

Some were recaptured less than 13 miles from the positions of liberation, partly in April (7) and partly in May (3), but none were caught here after the end of the spawning season, viz., in June and the following summer months. In this year the cod was more frequently recaptured in the Myggenæs district, where numerous specimens were recorded in May/June and the following months (about 25 %).

It is worth noticing that all specimens recaptured during the month of April are recorded within the "Nordhavet"; a majority of those from the month of May, in the Myggenæs-area and in the "Nordhavet" (by the end of May, however, a few individuals have reached the area off Sandø and Munken); in June several have reached the Sandø-area, and a few far south of Suderø. During July—October the dispersal appears complete, recaptures being recorded at various banks around the islands—but none in the "Nordhavet"; it is noteworthy also that out of 7 recaptured during August–October, 4 are recorded off Suderø or south of this island.

Table 9 a. Cod recaptured during spring and summer in the year of marking, 1937 (all specimens > 70 cm. initial length).

Liberation				Recapture					
Locality		Date and year	No. on label	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°34′ N.	6°49′ W.	3/4 37	6246	c.62°25′ N.	7°03′ W.	13/4 37	1/3	75—77.5	..	V	E
—	—	5/4 -	6340	c.62°34′	6°23′	16/4 -	1/3	80—83.6	..	VII?	S
62°31′	6°49.5′	9/4 -	6442	c.62°38.4′	6°31.3′	17/4 -	1/4	73—76.4	..	V	S
62°34′	6°49′	6/4 -	6414	c.62°18′	6°42′	19/4 -	1/2	73—75	♂	..	F
—	—	— -	6416	c.62°34′	7°01′	24/4 -	1/2	70—72.8	♂[1]	V	S
62°31′	6°49.5′	9/4 -	6429	62°27′	6°58′	25/4 -	1/2	70—71	♂[1]	IV?	S

[1]) Maturity VI—VII.

Table 9 a (continued).

Liberation				Recapture						
Locality		Date and year	No. on label	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°34′	6°49′	6/4 37	6415	c.62°32′	7°11′	25/4 37	2/3	75—76.5	..	V	S
—	—	5/4 -	6300	c.62°31′	6°34′	29/4 -	3/4	75— ?	..	...	E
—	—	— -	6350	c.62°31′	6°04′	c.1/5 -	c.1	70—70.6	..	IV	S
—	—	— -	6292	c.62°38.1′	6°39′	1/5 -	3/4	71—72.5	..	V?	E
—	—	— -	6291	c.62°15′	8°00′	5/5 -	1	78— ?	..	..	E
—	—	3/4 -	6262	c.61°58′	8°20′	5/5 -	1	86—88.5	..	VI	S
—	—	6/4 -	6422	c.62°31′	6°34′	10/5 -	1	88—90.2	..	VI	E
62°29′	6°49′	15/4 -	6508	c.62°06′	8°18′	10/5 -	3/4	82— ?	..	..	E
—	—	— -	6574	62°14′	5°50′	12/5 -	1	82—83	♂[1]	V?	S
62°34′	6°49′	5/4 -	6365	62°14′	8°12′	12/5 -	1 1/4	74— ?	..	..	E
—	—	— -	6322	c.62°12′	6°00′	15/5 -	1 1/3	76—77.9	..	V	E
—	—	— -	6303	c.62°01′	8°41′	20/5 -	1 1/2	78—79	♂	VI	S
62°29′	6°49′	15/4 -	6480	c.62°32′	7°09′	23/5 -	1 1/4	72—73	♂[2]	IV	S
62°34′	6°49′	5/4 -	6333	c.61°44′	6°28′	26/5 -	1 2/3	85— ?	♂[3]	VI	S
—	—	— -	6312	61°23′	6°44′	28/5 -	1 3/4	78—81.2	..	V	F
—	—	3/4 -	6270	c.62°02′	6°12′	1/6 -	2	80—83	..	VI?	S
62°31′	6°49.5′	9/4 -	6435	?	?	c.1/6 -	c.1 1/2	70— ?	..	..	S
62°34′	6°49′	5/4 -	6354	c.61°44′	6°25′	7/6 -	2	73—74.5	..	V	S
—	—	3/4 -	6280	c.61°44′	6°56′	8/6 -	2 1/4	81—83.1	..	V	E
—	—	— -	6273	c.61°42′	6°29′	c.10/6 -	c.2 1/4	72—75.1	..	V	S
62°29′	6°49′	15/4 -	6554	c.62°19′	7°30′	11/6 -	2	82—85.2	..	V	S
62°34′	6°49′	5/4 -	6337	c.61°46′	7°05′	12/6 -	2 1/4	80— ?	..	..	E
—	—	— -	6349	—	—	14/6 -	2 1/3	71— ?	..	..	E
—	—	— -	6325	c.60°48′	6°37′	17/6 -	2 1/2	80—82	..	VI	S
62°31′	6°49.5′	9/4 -	6469	c.61°59′	7°41′	19/6 -	2 1/3	70— ?	..	..	E
62°29′	6°49′	15/4 -	6491	c.60°48′	6°37′	19/6 -	2	86—87	♂[4]	VII?	S
62°31′	6°49.5′	9/4 -	6458	c.62°00′	6°04′	20/6 -	2 1/2	77—80.1	..	IV	E
62°29′	6°49′	15/4 -	6524	c.62°17′	7°20′	22/6 -	2 1/4	76— ?	..	..	E
62°34′	6°49′	3/4 -	6269	c.62°01′	7°36′	22/6 -	2 2/3	71—74	♂	V	F
62°31′	6°49.5′	6/4 -	6395	62°18′	8°05′	30/6 -	2 3/4	77— ?	..	..	E
62°34′	6°49′	5/4 -	6381	c.60°57.3′	7°02.3′	3/7 -	3	91—91.8	..	VI?	S
62°31′	6°49.5′	9/4 -	6455	c.61°48′	6°52′	8/7 -	3	72—75	♂	..	F
62°34′	6°49′	3/4 -	6267	c.61°56.4′	8°29.3′	15/7 -	3 1/3	83—86	..	VI	S
—	—	5/4 -	6308	c.60°52′	6°02′	15/7 -	3 1/3	76— ?	..	..	S
62°29′	6°49′	15/4 -	6525	c.62°11.4′	8°09.3′	21/7 -	3 1/4	82—83.7	..	V	E
62°34′	6°49′	3/4 -	6249	c.62°09.4′	7°59.3′	24/7 -	3 2/3	83—83.6	..	VII	E
—	—	— -	6198	c.60°38′	6°05.3′	c.2/8 -	4	91—92.7	..	VII?	S
—	—	— -	6252	c.62°10′	6°02′	5/8 -	4	82—86	..	VI	S
—	—	5/4 -	6378	c.61°36′	6°44′	13/8 -	4 1/4	80—80	♀	..	F
—	—	3/4 -	6260	?	?	c.17/8 -	c.4 1/2	75— ?	..	IV	S
62°31′	6°49.5′	9/4 -	6472	60°54′	6°37′	3/9 -	4 3/4	85— ?	..	..	E
62°34′	6°49′	5/4 -	6364	61°57′	7°10′	12/10 -	6 1/4	74— ?	..	IV	F
62°29′	6°49′	16/4 -	6595	c.61°53.3′	7°01′	12/10 -	6	76—86	..	IV	F
62°31′	6°49.5′	9/4 -	6463	c.61°20.4′	7°18.3′	30/10 -	6 2/3	81—82.2	..	V?	S

[1]) Recovering spent.
[2]) Maturity VII.
[3]) Recovering spent?
[4]) Recovering spent?

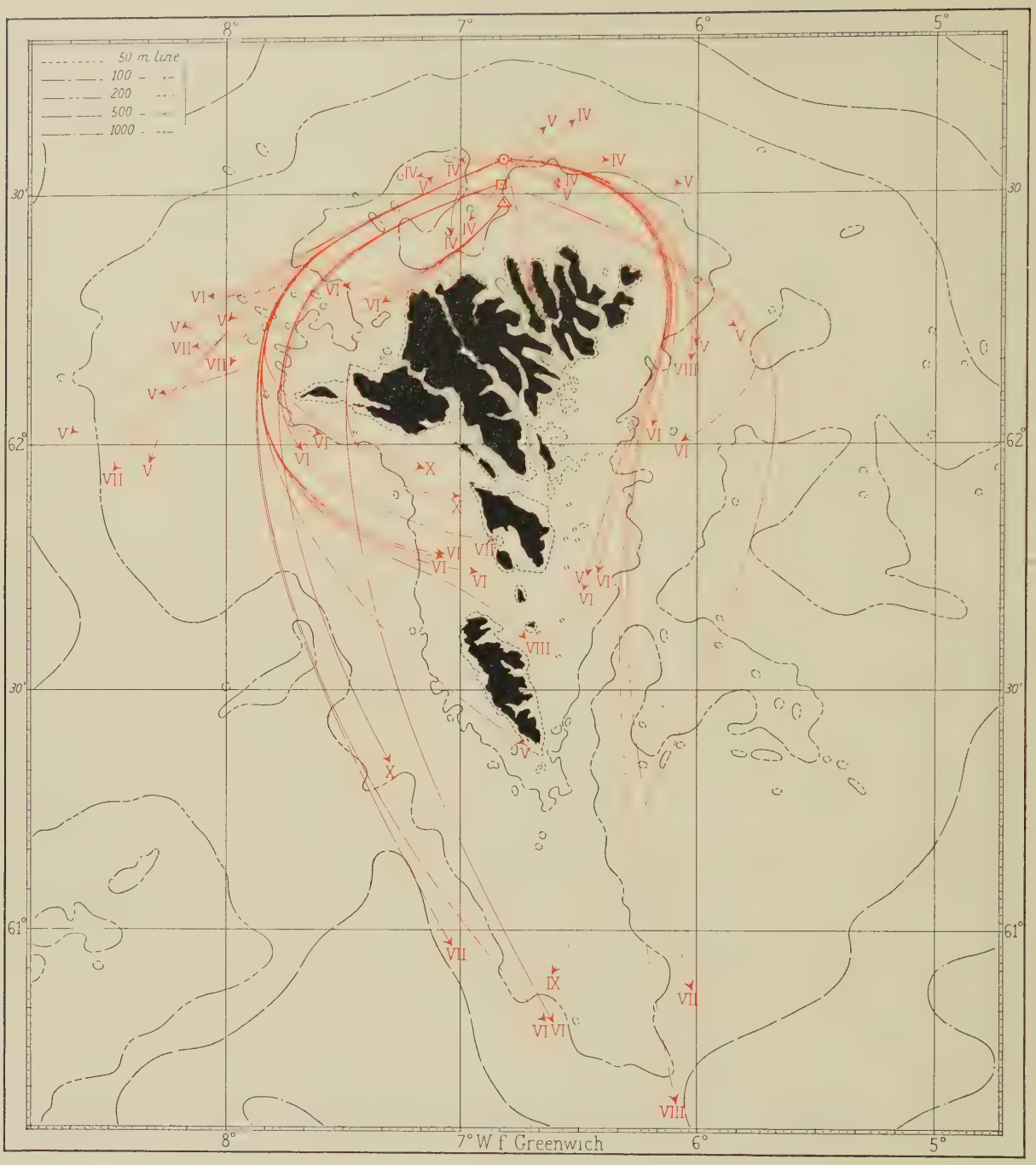

Fig. 12. Marking experiment April 1937. Dispersal of large cod during April—October of the marking-year. IV: recaptured in April, V: in May etc.

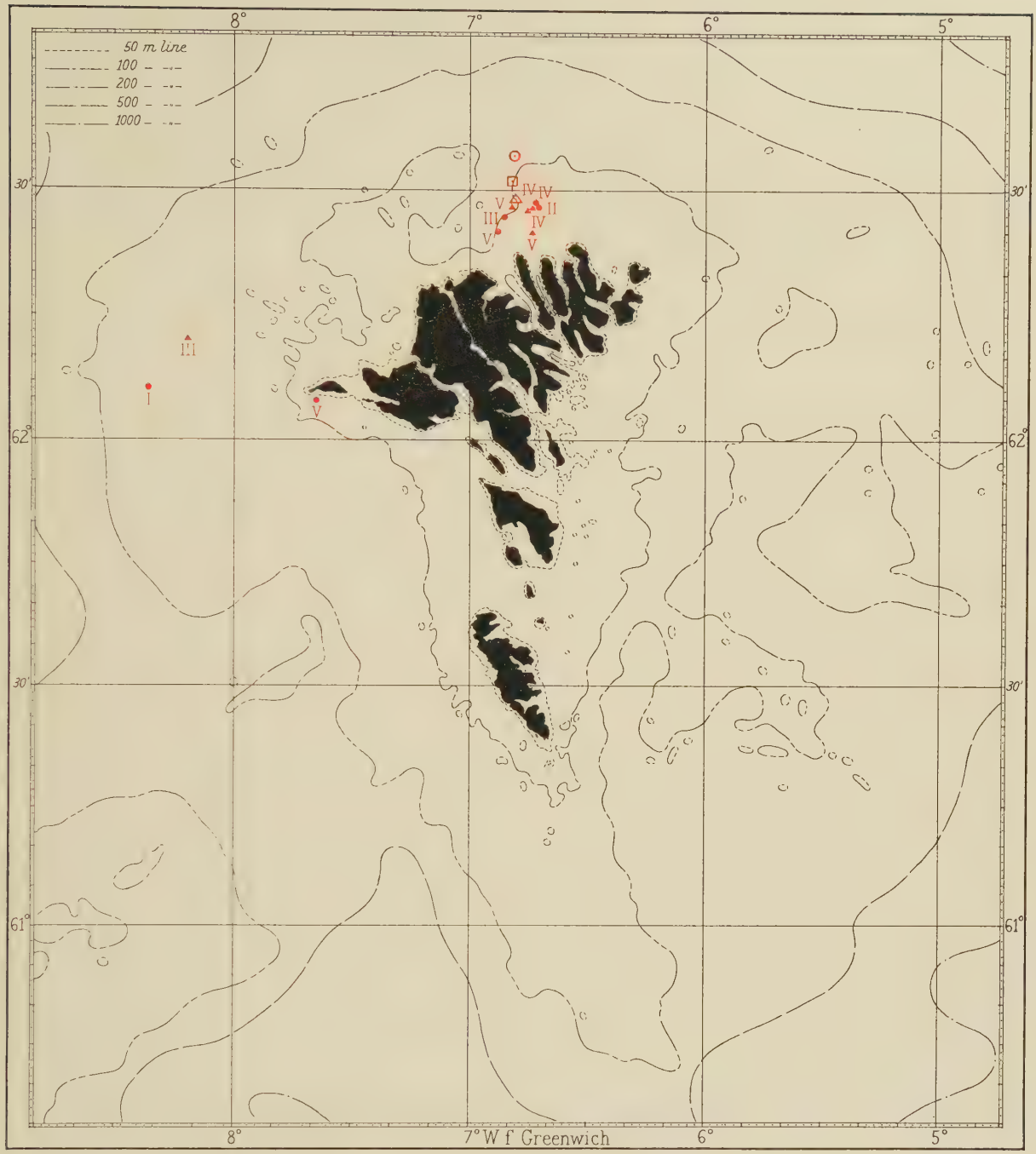

Fig. 13. Marking experiment April 1937. Localities of recaptured large cod during January—May of the year succeeding the marking-year. I: recaptured in January, II: in February etc.

Table 9 b. Cod recaptured during the spawning period of the year after the marking-year (all specimens > 70 cm. initial length).

Liberation				Recapture						
Locality		Date and year	No. on label	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°34′ N.	6°49′ W.	5/4 37	6305	c.62°06.2′N.	8°22′25″W.	25/1 38	9 2/3	90—94.5	..	VII?	S
—	—	3/4 -	6266	c.62°28′	6°45′	19/2 -	10 1/2	86—89	♀	..	F
62°29′	6°49′	15/4 -	6506	c.62°12.2′	8°12.3′	c.12/3 -	11	83—85	♂[1]	VII	S
62°34′	6°49′	5/4 -	6386	c.62°27′	6°52′	c.28/3 -	c.12	78—87	..	VI	F
62°29′	6°49′	15/4 -	6516	c.62°28′	6°45′	12/4 -	12	78—79	♂	VI	F
—	—	— -	6576	62°27.6′	6°46′	c.April -	c.12	79— ?	♂	..	F
62°34′	6°49′	5/4 -	6352	c.62°28′	6°45′	14/4 -	12 1/4	75—78	♂	VI	F
—	—	— -	6372	c.62°25′	6°54′	c.1/5 -	c.12 3/4	72—77	♀[2]	V?	S
62°29′	6°49′	16/4 -	6590	62°28′	6°50′	4/5 -	12 1/2	90—92	♀	VIII	F
—	—	15/4 -	6566	62°25′	6°45′	5/5 -	12 2/3	79—82	♂	VI?	F
62°34′	6°49′	6/4 -	6408	c.62°05′	7°40′	5/5 -	13	77— ?	..	..	E

[1]) Maturity VI.
[2]) Immature.

Table 9 c. Other recaptures of cod from the experiment of 1937.

Liberation				Recapture						
Locality		Date and year	No. on label	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Age-group	Fishing vessel
62°34′ N.	6°49′ W.	3/4 37	6215	?	?	6/11 37	7	72— ?	..	..	E
62°29′	6°49′	15/4 -	6494	c.61°12′ N.	6°33′ W.	10/11 -	6 3/4	74—76.5	♂	V?	S
62°34′	6°49′	5/4 -	6344	c.75°12′	16°10′ E.[1])	21/11 -	7 1/2	77— ?	..	..	E
—	—	— -	6351	62°00′	8°00′ W.	4/12 -	8	80— ?	..	..	E
62°29′	6°49′	15/4 -	6532	c.61°28′	6°32′	9/12 -	7 3/4	82—93	♀	..	F
62°31′	6°49.5′	6/4 -	6402	c.61°49.3′	6°22.3′	12/12 -	8 1/4	72—74	♂[2])	IV	S
—	—	— -	6389	c.62°31′	6°34′	1/3 39	22 3/4	79— ?	..	..	E
—	—	9/4 -	6427	?	?	26/3 -	23 1/2	77— ?	..	..	S

[1]) 60 miles NW. of Bear Island (depth 150 fathoms).
[2]) Maturity V.

This year's migration, like that of 1935, appears to have taken a westerly course, and moreover it is characteristic of the year that the migration towards the waters south of Suderø has been stronger than during most years. As mentioned previously trawling takes place all over the Faroe-area where the fishing grounds are visited from time to time all the year round; accordingly the distribution of records must be of some significance.

50 recaptures from April to October are distributed as follows:
April: 8; May: 13; June: 15; July: 6; August: 4; September: 1, and October: 3.

From Table 9c it will be seen that November and December each show 3 recaptures. One of these is specially remarkable: a specimen marked on April 5th was recaptured about 60 miles NW. of Bear Island on November 21st by the English trawler "Kingston Alalite" of Hull. It has already been mentioned that recaptures of Faroe cod outside Faroese

waters have been scarce, and this record, therefore, is all the more remarkable as it seems that the specimen in question has travelled at least 1100 miles within about 230 days.

The remaining 4 recaptures, of which position of recapture is known, have been recorded southwest of Myggenæs, east of Sandø and Suderø, and south of Suderø; as yet none had returned to the "Nordhavet" during November—December.

b) Considering now the recaptures during the early months of the following year (January to May) a still better confirmation of the return-migration to the spawning-grounds in the "Nordhavet" seems at hand than formerly by previous experiments. The chart, fig. 13, shows this clearly (see Table 9b also).

Eight out of eleven recaptures within these months are from positions almost identical with those of liberation; namely 1 in February, 1 in March and 3 in each of the months April and May; the remaining 3 records are from the Myggenæs-area: 1 in each of the months January, March and May, thus presumably on their way to or away from the centre of spawning north of the islands. A specimen (from April) has been recorded as immature.

The year 1938 has been recorded as better than any since 1925 in respect of the spring-fishery in the "Nordhavet"; presumably the cause of this has been that the fish in this particular year concentrated strongly at the well-known spawning grounds.

Later than May no recapture of 1937-marked fish has been recorded during 1938.

As to third-year recaptures, two were recorded in the spring of 1939 (March); one with certainty from the spawning grounds in the "Nordhavet", the other one probably from the same area (see Table 9c).

II.

Results from Marking Experiments on Cod liberated in Faroese waters at other Seasons than the Spawning-season (1909—1936).

It has been mentioned in the introduction, and summarized in Table 1, that marking experiments have been carried out during a long period of years at the Faroes, especially during the months June—September. The majority of markings, viz., 92.3 %, have been made on young cod of less than 70 cm. length. Young cod are usually caught so soon after marking that very few reach the size-classes of spawning cod and accordingly it has not been possible through the experiments on codling to obtain light upon the important question: Where in the Faroe-area do the mature cod especially accumulate in order to spawn? Later experience, however, having added considerably to our knowledge of the migration of mature cod, the earlier material has again been analysed by the present author, using especially the two important papers by Strubberg (1916 and 1933) concerning marking mostly of young cod in Faroese waters. The paper of 1916 in particular has been of great value as it contains all particulars of markings and recaptures.

The results obtained from markings in the period 1909—1913, will primarily be considered; the markings took place between May and September, scattered all round the islands. The experiments on the Faroe-Bank 1910 will not be considered here, because that stock of cod is mainly self-contained without important interchange with surrounding areas; it shall be mentioned, however, that two specimens leaving the Faroe-Bank for Faroese waters proper had reached maturity size; one was recaptured on July 6th 1911 north of the islands

(see STRUBBERG, 1916, p. 75, and record no. 6401 on p. 123), the other one of similar size was caught on August 12th 1910 off Suderø (l. c. No. 6519).

It will be convenient to divide the data of recaptures of large cod given by STRUBBERG into three groups.

a) We will first consider the recaptures of cod more than 70 cm. when marked, during January—May of the year following or the second year after the marking year (STRUBBERG, 1916, Tables on pp. 88—122).

29 recaptures are recorded, 6 of which however are of little value, particulars as to position being absent or uncertain; 2 out of the remaining 23 were caught in the second year after that of marking. Locality of marking as well as that of recapture has been recorded on chart fig. 14, with the month of recapture marked in Roman figures, and an Arabic "2" if caught after about two years liberty.

Table 10. Cod (> 70 cm. initial length) recaptured during the spawning period of the first and second year after the marking year. Experiments of 1909—1913 (*vide* STRUBBERG 1916).

Liberation			Recapture					
Locality		Date and year	Locality		Date and year	No. of months in the Sea	Init. & ultimate size	Sex	Fishing vessel
61°20′ N.	6°39′ W.	$^{23}/_{8}$ 09	61°19′ N.	6°39′ W.	$^{6}/_{4}$ 10	8	79—83.6	..	F
61°55′	6°33′	$^{16}/_{8}$ -	62°27′	7°12′	$^{7}/_{4}$ -	8	108—109.8	..	F
61°20′	6°39′	$^{23}/_{8}$ -	62°34′	6°58′	$^{9}/_{4}$ -	8	96—107.1	..	F
61°54′	6°42′	$^{8}/_{6}$ 10	?	?	$^{12}/_{1}$ 11	7	76— ?	..	E
61°56′	6°16′	$^{13}/_{5}$ -	62°00′	6°18′	$^{2}/_{3}$ -	10	73—78	♂	F
61°58′	6°25′	$^{7}/_{8}$ 09	62°40′	7°00′	$^{14}/_{3}$ -	19	83—94.5	..	E
61°20′	6°39′	$^{23}/_{8}$ -	61°54′	7°10′	$^{30}/_{3}$ -	19	99—(113)[1]	..	F
61°56′	6°16′	$^{13}/_{5}$ 10	61°56′	6°20′	$^{15}/_{4}$ -	11	72—89	..	F
61°58′	6°27′	$^{14}/_{8}$ 11	62°02.5′	6°10′	$^{8}/_{1}$ 12	5	79—81	♂	F
61°54.5′	6°37′	$^{17}/_{8}$ -	62°18.5′	6°17′	$^{11}/_{5}$ -	9	75—85	..	F
62°11.5′	7°33′	$^{20}/_{7}$ 12	?	?	$^{9}/_{2}$ 13	7	72— ?	..	E
61°57.7′	6°42.5′	$^{4}/_{7}$ -	62°00′	6°45.5′	$^{13}/_{2}$ -	7	94—96	♂	F
61°54′	7°10.5′	$^{7}/_{7}$ -	62°29′	6°48′	$^{25}/_{2}$ -	7	89—94	..	F
—	—	— -	?	?	$^{7}/_{3}$ -	8	82—85.5	♂	S
—	—	— -	61°54′	7°14′	$^{24}/_{3}$ -	8	84—89	♀	F
61°56.5′	6°30.5′	$^{2-3}/_{7}$ -	62°29′	6°42.8′	$^{26}/_{3}$ -	8	91—102.5	..	S
61°48′	5°27′	$^{18}/_{6}$ -	62°15′	4°50′	$^{27}/_{3}$ -	9	72—74	..	E
61°54.5′	6°12′	$^{1}/_{7}$ -	62°02′	6°13.5′	$^{2}/_{4}$ -	9	84—87	♀	F
—	—	— -	62°26′	6°57′	$^{4}/_{4}$ -	9	94—96.2	♀	S
61°54′	7°10.5′	$^{7}/_{7}$ -	?	?	$^{9}/_{4}$ -	9	77— ?	..	E
61°48′	5°27′	$^{25}/_{6}$ -	62°31.3′	6°40′	$^{12}/_{4}$ -	10	79—85	..	F
61°54′	7°10.5′	$^{7}/_{7}$ -	62°25′	8°35′	$^{14}/_{4}$ -	9	83— ?	..	E
61°48′	5°27′	$^{25}/_{6}$ -	61°43′	5°36′	$^{28}/_{5}$ -	11	71—(79.7)[1]	..	F
—	—	— -	—	—	$^{30}/_{5}$ -	11	81—85	..	F
61°50′	6°56′ to	$^{27}/_{6}$ 13	61°09′	7°03′	$^{13}/_{1}$ 14	7	71—76	♀	F
61°57′	7°04′								
—	—	$^{26}/_{6}$ -	?	?	$^{16}/_{1}$ -	7	83—90.5	..	S
—	—	$^{27}/_{6}$ -	62°20′	7°35′	$^{2}/_{3}$ -	9	88— ?	..	E
—	—	$^{26}/_{6}$ -	61°54.5′	7°49.5′	$^{9}/_{3}$ -	9	74—83.4	..	S
—	—	$^{27}/_{6}$ -	?	?	$^{18}/_{3}$	9	80— ?	..	E

[1]) Length recorded in Danish inches.

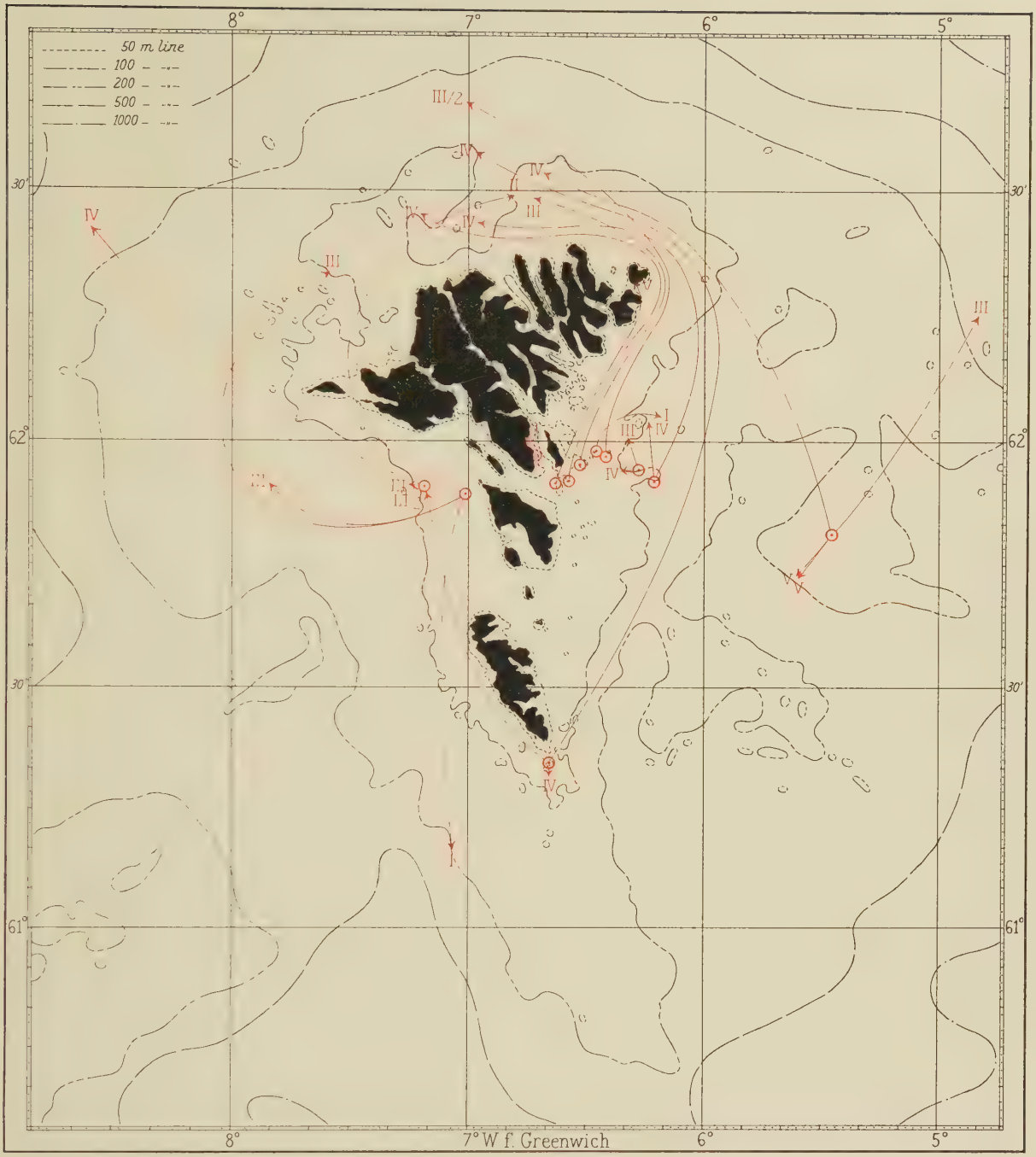

Fig. 14. Localities of recaptured large cod from experiments 1909—13. All specimens more than 70 cm. initial length. Recaptures from January to May of the succeeding years; "2" indicates recaptures from the second.

From the chart it clearly appears that of cod which have emigrated from the vicinity of the marking locality the majority have gone north, most of them (7) to the spawning grounds in the "Nordhavet", one to the spawning grounds in "Vaagøhavet", while 6 were scattered over the banks, but one only was recaptured far south of the marking place (in January). It may be assumed that some of the 9 cod recaptured near the marking locality (all > 70 cm.) have spawned here or were going to spawn in the near future; some of them had, however, probably not yet reached maturity.

Details are recorded in Table 10 and on the chart fig. 14, in respect of the 23 specimens for which the position recorded can be accepted.

b) A second group of recaptures is that of individuals of less than 70 cm. in length when marked but more than 70 cm. when recaptured within the period January—May in the following year or the second year after marking. (See STRUBBERG, 1916, Tables pp. 88—122).

Again we have 29 records of such recaptures, all but one measuring 70—79 cm. at recapture, the last one, 83.7 cm., having been at liberty until the second year. 21 were caught in the year following marking, 8 in the second year.

Plotting these records on a chart it may be seen that no more than 10 have travelled more than 15 nautical miles from the marking locality, 6 of which were scattered widely north of the islands (3 near the principal spawning ground in the "Nordhavet"); the remaining 4 seem to have dispersed irregularly over the banks, none, however, to the area south of Sandø.

A minority only of cod less than 70 cm. when marked being expected to mature in their period at liberty, even this group shows some tendency for migrating towards the spawning ground in the "Nordhavet".

The material, however, is too scanty to be worth neither chart nor table in this report, apart from the particulars already given in STRUBBERG's paper.

c) Some interest is also attached to the recaptures from the months June to December of the year following the marking year, cod over the 70 cm. limit by then considered only. They were accordingly recaptured during the period in which cod, that had spawned during the spring, might be expected to have dispersed all over the banks. Such recaptures number 25, 10 of which were more than 70 cm. in length when marked, and 15 below this limit. Ten only had travelled more than 15 nautical miles from the marking locality; they were recaptured scattered over the banks to north, west and east: 4 in the Myggenæs-area, 3 close to the north-coast, and 3 east and west of the islands, but within 20—40 nautical miles of the marking locality. The few individuals which have travelled some distance mainly show a dispersal over the whole northern area, none, however, to the area south of Sandø.

Evidently but few specimens of this category have spawned in the said year and then emigrated from the spawning localities; this assumption seems the best to adopt in respect of the recaptures mentioned from the Myggenæs-area and the north-coast.

Also in respect of this material the reader is referred to the tables published in STRUBBERG's paper (l. c.), and no chart or excerpt of tables seems necessary for the present discussion.

As to other marking experiments carried out at the Faroes we shall mention only those of 1923, 1924, 1925, and 1936. Only a very few individuals of lengths above 70 cm. were marked at all. Some few of the recaptures confirm the results obtained from the experiments on spawning cod.

Experiments 1923: A single specimen only is of interest; it was marked southeast of Skaalhoved on August 13th 1923 at a length of 69 cm. and was recaptured in the "Vaagøhavet" next year on the 6th of February, measuring then 73 cm. The locality of recapture early in the spawning season in the "Vaagøhavet" indicates the possibility of maturity being reached. Some spawning takes probably place in this area.

The other very few recaptures of larger cod from this experiment are of no interest to the present discussion (see otherwise Strubberg, 1933, pp. 6 et seq.).

Experiment 1924: No recapture is recorded of cod measuring more than 70 cm. from this year's small experiment.

Experiments 1925: 3 recaptures of cod more than 70 cm. in length are recorded during spring (March—April) 1926. The marking took place east of Nolsø; one specimen had travelled some 30 nautical miles to the northeast, one to the northwestern coasts of the islands (northwest of Myggenæs) and one to the spawning grounds north of the islands where it was recaptured on April 16th 1926.

Experiments 1936: This year the Scottish research vessel "Explorer" undertook marking with Danish cod marks in Faroese waters, 95.6 % of the fish were below the 70 cm. limit when marked; 13 of the marked fish measured more than 70 cm.; only 2 > 70 cm. were recaptured, both during the summer season and fairly close to the place of marking.

Most of the marking experiments mentioned in this chapter have dealt primarily with young cod from many localities all round the islands, and the majority of the experiments has been made during the summer season; when related to the question under discussion in this paper, the results obviously must be of but minor value to this particular investigation. The few results obtained, nevertheless, support in an interesting way the results obtained from the marking experiments on spawning cod north of the islands because they show that cod marked in various localities scattered all over the Faroe area preferably make for the spawning grounds north of the islands when they are mature or approaching maturity.

Some of the cod marked of lengths up to 80 cm. have, however, very likely been immature, and the ideal experiment for the present investigation would be one of marking cod of lengths between 80 and 100 cm., caught, marked and liberated in the autumn all round the islands; such an experiment is however very difficult to carry out owing to the scarcity of large cod in Faroe catches outside the period in which accumulation occurs.

III.
Age and Growth of Cod Marked on the Spawning Grounds.

Finally, some remarks should be made on the age and growth of the recaptured cod, summarizing such particulars from the tables as may be of interest in connexion with this report. The main object of this being to investigate the migrations of mature cod in the Faroe area, the study of the age and growth of the Faroe cod is of secondary interest only and consequently these questions will not be subject to any detailed discussion.

The age-composition of the cod caught by Faroese fishermen in the "Nordhavet", viz., the grounds where the marking experiments under consideration have been made, has been

investigated regularly during the period 1933–1938; from a total of 1492 individuals age-analysed the following percentage-composition has been obtained:

Table 11. Age-distribution of cod from spawning grounds north of the Faroes.

Age-group	III	IV	V	VI	VII	VIII	IX	X+
Percentages	1.9	15.3	22.1	17.5	16.8	12.5	4.5	9.4

It should be mentioned that but few individuals of the III-group have been mature fish as very few specimens of this group have surpassed the 70 cm. limit; on the other hand the greater part of the IV-group may be considered as actually spawning fish.

Studying the age-composition of the recaptured cod from which otoliths have been obtained we reach an age-composition very similar to that of table 11, as will be seen from Table 12[1]).

Table 12. Age-composition of recaptured cod marked during the 1927—1937 experiments[1]).

Age-group	IV	V	VI	VII	VIII	...	XIII	Total	Spec. not analysed[2])	Total	%
Calendar-year											
1.[3])	13 (2)	32 (7)	22 (7)	14 (8)	4 (2)		1	86	61	147	77.8
2.	—	4 (1)	8 (1)	7 (1)	3 (1)		—	22	12	34	18.0
3.	—	—	—	1 (1)	1		—	2	5	7	3.7
4.	—	—	—	—	—		—	0	0	0	—
5.	—	—	—	—	1		—	1	0	1	0.5
Total	13	36	30	22	9		1	111	78	189	100
%	11.8	32.7	27.3	20.0	7.3		0.9	100.0	..	..	..

[1]) Numbers in brackets indicate doubtful specimens included in the Totals. Specimens have not been separated as to sex, the determination of which is not perfectly reliable.

[2]) Otoliths not received together with the marks.

[3]) Year of marking.

The material indicates that undoubtedly very few specimens of the III-group have been subject to marking, the majority belonging to the IV—VIII-groups. This agrees well with the analyses of the catches given above (Table 11). Some few cod have been of considerable age and something might be said in favour of the possibility that they have been immigrants from other waters, probably from the Faroe-Iceland ridge, for instance.

During the marking many large specimens have probably been rejected, as large cod are more liable than small ones to swallow hook and bait completely, thereby being subject to damage sufficient for the rejection of such specimens. Moreover, the assisting fishermen have possibly discarded more large cod than small ones owing to the fact that they were entitled

[1]) Figures in brackets below the total number, indicate the number of individuals difficult to determine and which might actually belong to one of the neighbouring groups, or might be placed there by another investigator; such specimens are included in the total number given. Otoliths of Faroe cod are sometimes difficult to determine, particularly those of mature cod. The reason may probably be the comparatively high temperature in Faroe waters subject to minor variations only from winter to summer which causes some growth throughout the whole year.

to keep the fish rejected—and large cod are of course more valuable to them than smaller ones. Rejection of large individuals is an obvious fact proved by a comparison between the percentages of older groups in Tables 11 and 12.

It will be seen from the table that a certain movement towards older age-groups occurs when moving from first to second, and from second to third year and so on; this is quite obvious because those recaptured in the third year must then belong to the VI-group, or more, as specially mature cod have been marked and maturity is not generally reached until the fourth or fifth year of age.

As regards the growth of the marked and recaptured fish, the length of which was more than 70 cm. at marking, it should be remembered that measuring during marking cannot always be perfect (due to bad weather etc.); similarly the measurements of the cod recaptured given by the fishermen must be accepted with some reservation. In case the length recorded seems doubtful, a "?" has been affixed in the tables. Obviously reliable measurements would be very valuable, as the growth, for instance, during the first year after marking could then be determined for mature cod.

It is impossible, however, to draw any safe conclusions from the present material, which in the first place, is comparatively small and, secondly, originates especially from a period of less than 12 months, the majority being recaptured even less than 4 months after marking. Rejecting all records to which the slightest doubt may be attached, the following average growth increments are obtained for the different size-groups (females and males combined):

Table 13. Growth-increment in cm.'s of marked and recaptured cod, 1927—1937.

Initial length	Months after release												
	<1	1	2	3	4	5	6	7	8	9	10	11	12
70— 79 cm.....	2.1	1.3	2.0	2.0	0.0	2.5	4.5	..	2.0	6.0	..	4.0	4.2
	(7)[1]	(12)	(8)	(2)	(1)	(1)	(3)	..	(3)	(1)	..	(2)	(7)
80— 89 —	3.4	2.0	2.2	2.5	1.6	2.8	2.2	1.4	4.7	5.9	3.0	2.3	..
	(3)	(8)	(7)	(5)	(5)	(4)	(3)	(1)	(2)	(3)	(1)	(5)	..
90— 99 —	2.5	..	1.8	0.8	1.7	..	..	2.6	..	3.6	6.8	..	2.0
	(1)	..	(2)	(1)	(1)	..	..	(1)	..	(2)	(2)	..	(1)
100—109 —	..	..	0.7	..	..	..	..	2.0	..	..	..	..	..
	..	..	(1)	..	..	..	..	(1)	..	..	..	..	..

[1]) Numbers in brackets indicate number of observations.

One possibility should be remembered when specimens of rapid growth is concerned: such specimens may either be immigrants from the Faroe Bank area where the growth-rate is considerably higher than that of the Faroes proper, or they may have been still immature when marked.

As to individuals which have been at liberty for more than 12 months, 4 records only indicate the following growth increments:

	Months at liberty	Length when marked	Length when recaught	Growth
1.....	$13^2/_3$	84 cm.	92 cm.	8 cm.
2.....	22	95 —	99.3 —	4.3 —
3.....	$23^1/_2$	72 —	93.5 —	21.5 —
4.....	48	79 —	89 —	10 —

The structure of the rings of the otolith from the last-mentioned individual indicates very slow growth and confirms the low increment.

The table (13) indicates that the marked cod most probably spawning when marked—generally grow very little during the period immediately after the spawning (generally no more than a couple of centimetres, 0 to 4 cm.); this result seems perfectly acceptable as the food must primarily be spent to restore the body in general before growth in length may begin; not until some 6 months after marking (spawning) does growth in length become noticeable, and even then it may vary from 1 to 9 cm. during the first year after liberation.

IV.
General Survey of the Results of Marking Experiments on Large Cod at the Faroe Spawning Grounds.

Above, a series of detailed data has been given on cod (more than 70 cm. in length) marked at the spawning grounds north of the Faroe islands during recent years (Chapter I) and, in addition, certain details of the results from previous experiments on large cod in other Faroese waters of interest in this connexion (Chapter II); age and growth, finally, have been outlined in general (Chapter III). After a discussion of certain conditions in connexion with the experiments the results will be summarized on the following pages.

It would appear a comparatively easy task to investigate the migrations of cod within a limited area like the Faroese waters, but it is, actually, owing to just the limited extension of the area that difficulties arise, because the experiments are made on fish that travel as fast and as extensively as do the mature cod. This becomes the more evident when considering previous experience as to the speed at which cod is able to travel, whether passively carried by the currents or more actively by the efforts of the fish itself; such speed is known as 10—15 nautical miles per diem (or 18—28 km. per 24 hours) as a maximum. As the extent of the Faroe area, within the 200 m.-line, from north to south is but just over 120 nautical miles and from east to west slightly below this distance, the cod is able easily to cover such distances in a short time; finally it should be remembered that the speed of the currents in the Faroe area generally is fairly high. Considering these facts, it will be noticed that a marked cod easily may travel from one end of the area to the other in less than 8—10 days. If the majority of large cod were travelling at such maximal speed within the Faroe grounds, the results of marking experiments might easily be effaced; fortunately, it seems that the majority of fish moves at a considerably lower speed, and that, accordingly, the arrangements made for the investigation make it possible to form a picture of the movements of the stock, in time as well as space.

A greater difficulty is caused by the fact that the cod fishery within the Faroe area is carried out with an intensity that does not permit more than a few recaptures from one particular experiment to be made later than one year after marking; in the third year extremely few recaptures can be expected. In spite of the fact that more than 1000 large cod of more than 70 cm. in length have been marked the number of recaptures in the third year (calendar-year) have been seven only (0,7 %), and later on one single specimen only has been caught, viz., 48 months after marking (see page 23).

The following small table (14) records the distribution of the recaptures during successive years:

Table 14. Number of recaptures within the first year (i. e., the calendar-year of marking) and during the following calendar-years.
(Results of experiments carried out during March—April and in May 1932 included).

Year of marking ...	1927	1932	1934	1935	1937	Total
Number marked ...	199	226	14	244	411	1094[1])
Year						
1st	19 (2)	27	3	40 (3)	56	145 (5)
2nd	5	16	0	4	11	36
3rd.....	2	2	0	1	2	7
4th.....	0	0	0	0	0	0
5th.....	0	0	0	1	0	1
Total...	26	45	3	46	69	189

[1]) 56 specimens were less than 70 cm. in length when marked; 5 of these only were recaptured (indicated in brackets); all within the first four months of liberation.

A still more unfavourable picture as to the length of time in which recaptures of large cod marked in the Faroe area may be expected is given in Table 15 below, recording the number of all recaptures per month. From this it will be noticed that one single cod only has been caught, more than 24 months after the date of marking. For comparison it may be mentioned that experiments in Iceland and Greenland waters frequently show recaptures of marked cod 48 to 108 months after marking. The marking method being the same in all these waters and no indication existing that Faroe cod are more liable to loose the mark at any earlier date, the rapid decrease in recaptures in Faroese waters shows the high intensity of the fishery in this area (see also: TÅNING, "Journal du Conseil", 1937, Vol. XII, pp. 11—12).

Table 15. Number of recaptures per month after marking. (All experiments during March and April, and that of May, 1932, included).
1038 Cod marked (all more than 70 cm. initial length).

Months	<1	1	2	3	4	5	6	7	8	9	10	11	12	13
Recaptures.....	14	34	35	19	11	6	7	7	7	7	3	9	11	2

Months	14	15	16	17	18	19	20	21	22	23	24	25—47	48
Recaptures.....	1	0	0	1	1	1	0	0	2	4	1	0	1

In passing it should be mentioned that the fishermen who have recaptured marked cod at the Faroes, at Iceland, and in Greenland waters on few occasions only have given information to the effect that the mark, or the silver-wire, has wounded the gill-cover so badly that loss of the mark might be feared if the cod had remained at liberty. The present material includes three records only of such reports; most frequently the condition is reported good; in a few cases an ulcer where the mark was fixed has been recorded. As far as the present material is concerned, however, such reports all refer to individuals caught within the first six months after liberation.—It would be very helpful if those who catch marked fish, or who have an opportunity of inspecting such fish, would give as full information as possible as to the condition of the specimens and as to how they had sustained the marking, in order that attempts could be made to improve the type of mark and the method of fixing it.

The table (15) above will not, however, be subjected to any detailed discussion here,

as the prime object of this report is the study of the seasonal migrations of the cod, which to only a limited extent could be recognised in such arrangements of the material, more suitable for showing the durability of the mark and the value of the marking method.

Table 16 records the distribution of recaptures over the months of the years in which made. The table shows that the majority of recaptures are made during the 3 to 4 months following the marking, and that we have a concentration of the marked large, mature cod in the spring-season of the following years; some few recaptures only are recorded in other months when the cod has dispersed over the banks.

Table 16. Recapture-distribution by months. (Experiments 1927—1937. All recaptures from March—April markings and those of May 1932).

Year	Jan.	Febr.	March	April	May	June	July	Aug.	Sept.	Okt.	Nov.	Dec.	Total
1st	..	..	1	11	32	38	17	14	5	5	7	11	141[1])
2nd	6	2	9	10	4	1	1	..	..	1	1	1	36
3rd	..	..	6	1	..	..	..	..	..	..	..	..	7
4th	..	..	..	..	..	..	..	..	..	..	..	..	..
5th	..	..	..	1	..	..	..	..	..	..	..	..	1
Total...	6	2	16	23	36	39	18	14	5	6	8	12	185[1])

[1]) + 4 without date of recapture.

It will easily be understood that no small number of cod will have to be marked to obtain only a few recaptures at the Faroes during the 2nd or 3rd year; and it should be emphasized here how necessary it is that some thousands of large cod will have to be marked to extend and possibly complete the results hitherto obtained.

It should be mentioned here that it is very doubtful whether all marks—or nearly all of them—are noticed by the crew of the trawlers and forwarded to us; and this fact, obviously, has a great influence on the results. Several marks may happen to be overlooked and to this may be added that many trawler-skippers are but little interested in the investigations or the reward, and do not take the trouble to return the marks. On the other hand, owing to methods of fishing, Faroese fishermen cannot easily overlook the marks, and, thanks to the reward, but few marks will be retained without delivery to the fishery-officers.

Another important cause that makes the investigation of the migrations of large cod at the Faroes difficult—as to space and time—is the fact that the fishery to some extent moves from place to place according to season. Naturally the locality of the fishery determines the locality of recaptures, and nothing is known as to the presence of marked fish within areas where fishing does not take place at the season concerned or, perhaps, not at all.

It is necessary, therefore, in this connexion to consider what Faroe areas are the most important to the cod fisheries. The main fishing grounds frequented by Faroese fishermen are:—in spring—the "Vaargrunden" in the "Nordhavet" and the "Vaagøhavet" south-west of the Vaagø-Sandø;—in autumn—preferably the area west of the Suderø and in the neighbourhood of "Munken". A survey of the size-composition of cod taken in these important areas has been given in Fig. 5. However, fishing by Faroese fishermen also takes place in other areas and at other seasons, but the localities mentioned are the most important. As to recaptures, 20 % only are recorded by Faroese fishermen, the majority being secured

in spring in the "Nordhavet". Some 80 % of the recaptures are, however, recorded by foreign trawlers. The percentage distribution as to nations has been recorded in the following table (17).

Table 17. Nationality of fishing vessel.

	English	Scottish	Faroese	Norwegian	Unknown
No. of recaptures	63	83	38	1	4
Percentage	34.1	44.9	20.5	0.5	..

The trawl-fishery is carried on almost exclusively by English and Scottish trawlers, and it is somewhat difficult to localize in respect of season on the extensive banks around the islands. According to the information obtained, trawling is highly concentrated in spring (March to May) in the "Nordhavet", during the month of April in particular a great number of trawlers works in these waters, but moreover trawlers are at work all round the islands at all seasons. To show this a survey of trawlers observed fishing has been compiled in Table 18 from the observations of the patrol vessels during a series of years. The observations chiefly cover the waters within the vicinity of the 3-mile limit and thus cannot give a complete picture of the actual distribution of the fishing fleet, because distant fishing grounds like those off Myggenæs, off Fuglø, etc. are subject to rather few observations. It is generally believed, however, that about 40 trawlers is daily average fishing round the islands; the table records from 35 to 38, and the figures given in the table may accordingly be considered as fairly reliable.

Table 18. Average number of trawlers observed per diem at various seasons within various districts off the Faroes during 1928—1938.
(Fig. 15 shows the locality of the various districts).

	Season			
District	January—May	June—July	August—October	November—December
1. North	12.5	3.3	7.5	6.9
2. Northwest	5.0	8.7	3.9	9.9
3. Northeast	4.2	4.8	4.2	2.8
4. East	3.1	4.3	4.8	4.7
5. West	4.3	4.0	4.2	6.1
6. Southeast	3.7	4.5	4.2	1.5
7. South	5.2	5.5	6.5	5.6
Total...	38.0	35.1	35.3	37.5

It is not necessary here to specify how this table has been compiled; it should suffice to mention that the figures recorded give the average number per diem of vessels observed actually fishing the different districts (Fig. 15) at the respective seasons. The actual number of days on which observation of trawlers or other fishing vessels has been possible alone are considered, with due regard to the nature of the present material and in order to eliminate the numerous foggy days etc.

From Table 18 it appears that there is a distinct concentration in spring in the "Nordhavet", but there is no time of the year when trawlers are not at work somewhere round the islands. Provided marked fish are present, a concentration of recaptures therefore is bound to take place in spring in the "Nordhavet"; however, trawling also takes place here in summer, for lemon sole and haddock e. g., and if marked cod were present in any number, some of them could hardly escape capture. The fact that very few recaptures are recorded

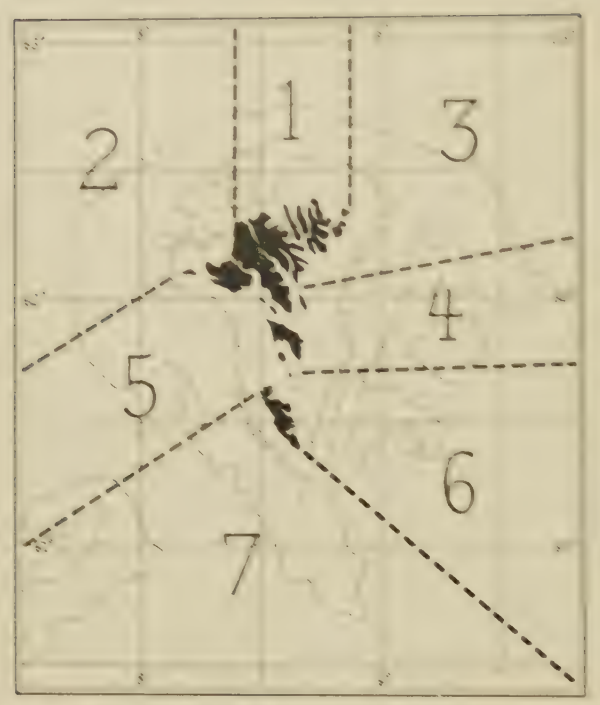

Fig. 15. Areas of observations (see text).

during summer in these areas, while records are fairly frequent at other grounds all round the islands (see e. g. Fig. 16, 2), compels the conclusion that all, or practically all cod have emigrated from the spring spawning grounds.

Areas that are much less fished than the banks, are the slopes towards the deep all round the islands. These slopes are in many places so rocky and stony that they were formerly not visited by trawlers, and they are moreover in some places so overcrowded with great sponges that trawlers but rarely have worked here, even if cleaner spots are scattered among the thickly covered areas; recently, however, some trawlers have tried to exploit these grounds also. Probably a certain percentage of the cod that survive the spring trawling season find a refuge here from June to next spring. For several years a long-line fishery has taken place on these slopes, for Cod, large Haddock, Tusk and Halibut; and a certain number of recaptures has actually been recorded here, especially in the summer months when this fishery is most profitable.

From the above considerations it will appear that certain conditions exist that make it necessary to judge the lists of recaptures with some care. It is for instance evident that the distribution of the fishing fleet to some extent might be responsible for the picture we have obtained. But on the other hand the results are so obvious, that there can be no doubt about the main features in the distribution of the large mature cod in the Faroe area throughout the months of the year.

Supported by the charts Figs 16—17, and Table 19, an attempt will be made below to summarise the results obtained from the marking experiments described.

The two series of charts in Figs 16 and 17 record all such recaptures of cod from the experiments 1927—1937, the positions of which are definitely known; the year has been divided into four seasons: January—May, June—July, August—October, and November—December, and all recaptures, irrespective of year, have been plotted on the corresponding seasonal chart. Recaptures from the minor experiment in May 1932, have been included.

The first series of charts (Fig. 16) records all recaptures during the calendar-year of marking (the first year), the second series those of the 2nd and 3rd calendar-years.

Table 19 is arranged similarly and divided into 7 districts (cf. Fig. 15), number 1 of which covers the most important spawning area.

It appears that the cod disperse over the banks after the marking, especially during the first month after liberation. During the month of marking (viz., April in particular) all recaptures (100 %) are recorded from the immediate neighbourhood of the marking localities; chart Fig. 16, and Table 19 also show that by the end of May only a few cod have been recaptured in the southern area, for instance south of the latitude 62° N.

Tabel 19. Recaptures arranged by year, by season and by district (Number and %).

Season	1st year (year of marking)								2nd and 3rd year							
	April—May		June—July		Aug.—Oct.		Nov.—Dec.		Jan.—May		June—July		Aug.—Oct.		Nov.—Dec.	
District	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
1. North ...	14	35.9	0	—	1[1]	5.5	1	6.2	20	57.1	0	—	0	—	0	—
2. Northwest	12	30.8	20	44.4	5	27.8	6	37.5	6	17.1	2	(100)	0	—	0	—
3. Northeast	7	17.9	5	11.1	3	16.7	2	12.6	7	20.0	0	—	1	(100)	1	(50)
4. East	2	5.1	3	6.6	2	11.1	1	6.2	0	—	0	—	0	—	0	—
5. West	3	7.7	10	22.2	2	11.1	3	18.7	2	5.7	0	—	0	—	0	—
6. Southeast	0	—	2	4.4	1	5.5	1	6.2	0	—	0	—	0	—	1	(50)
7. South....	1	2.6	5	11.1	4	22.2	2	12.6	0	—	0	—	0	—	0	—
Totals...	39	100.0	45	99.8	18	99.9	16	100.0	35	99.9	2	—	1	—	2	—

[1]) Near the islands.

During the months June to December, practically no cod has been recaptured close to the marking locality while some are caught both east and west thereof, but no less than 44—50 % are taken in the more southerly waters south of ca. 62° N. The general dispersal becomes still more obvious when studying the percentages of recaptures in the southernmost area (Distr. 7) in consecutive seasons; from about 3 % in the season April—May, through 11 % in June—July it reaches about 22 % by August—October. By the end of the year, a return to more northerly waters seems to take place, possibly *via* the waters west of the islands (Vaagohavet); thus it will be noticed that the November—December chart is very much like that for June-July.

From the short review above it will be seen that after spawning the cod disperse on feeding migration from the spawning grounds in the "Nordhavet" (Vaargrunden) westwards as well as eastwards and go further south during the following months; later in the summer and in early autumn many of them have reached the area around the Sudero, or even further south; this agrees well with the fact that at this season a somewhat intensive fishery takes place here on larger cod, for instance off the "Munken".

A great number of the cod, however, remain in more northerly waters, for instance in the Myggenæs area, but very little, so far, is known as to the numbers which migrate to the slopes all round the islands; the charts show, however, some records of recaptures outside the 200 metre line.

It is generally stated by Faroese fishermen that the cod in course of and towards the close of the spawning period moves more and more to the East, i. e. in the main direction of the currents. A study of the present material, however, shows that a dispersal takes place to the west as well as to the east, and the number of recaptures in the west is twice as great as in the east. From this it might be presumed that the majority of the emigrants moves westwards, but from the present material a final conclusion can hardly be drawn, when we consider that nearly all recaptures recorded during the summer derive from trawlers working the offshore banks, and that they evidently work more intensively in the west than in the east, a fact that shows that the material available makes it impossible to come to a definite solution as to the real quantities distributed to west and east. It is indisputable, however, that dispersal takes place in both directions, and not one way only. Most likely this dispersal varies from year to year according to currents and other important factors, e. g. quantity of food etc.

1st Year. April—May.

Fig. 16. 1.

June—July.

Fig. 16. 2.

2nd and 3rd Year. January—May.

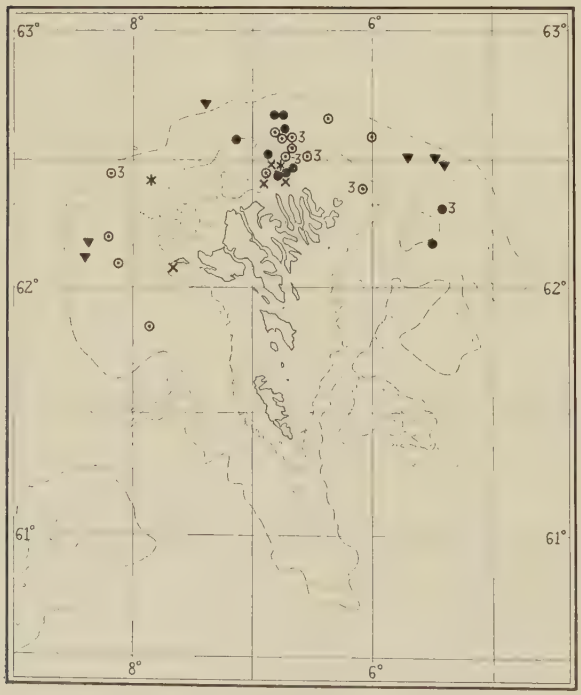

Fig. 17. 1.

"3": recaptures during the 3rd year.

June—July.

Fig. 17. 2.

Fig. 16—17. General survey of recaptures of large Cod mar

Symbo

I (January): ▼ — II (Febr.): ∗ — III: ⊙ — IV: ● — V: × — VI:

August—October.

Fig. 16. 3.

November—December.

Fig. 16. 4.

August—October.

Fig. 17. 3.

November—December.

Fig. 17. 4.

he "Nordhavet" and recaptured during the following 24 months.

ptures:

VII: ϕ — VIII: ○ — IX: + — X: △ — XI: ▲ — XII: ▽.

Studying the first seasonal chart of the second series (Fig. 17), covering recaptures from the latter half of the winter and from the spring, viz., the spawning season of the cod, the recaptures show a concentration particularly within the waters where large cod were marked in the previous spring (or two years before). Also Table 19 emphasizes this fact by a percentage as high as 57 % of all recaptures in spring within this minor area, i. e. the same area in which during the preceding six months a few individuals only were caught. Moreover 94 % of all recaptures during the period: January—May, were made north of the 62° N. Lat., in spite of the fact shown by Table 18, that trawling at this time of the year also takes place on many other banks round the island, although the main fishing ground is the "Nordhavet". Of recaptures during the spring of the third year, only six records with correct positions exist, which all have been plotted on Fig. 17, 1. Later in the second year very few recaptures are made (Fig. 17, 2—4), but these records also confirm the experience of the first year, viz., dispersal over the banks far from the spawning grounds.

The experiments show that at any rate part of the cod marked in one spring on the spawning grounds in the "Nordhavet" return next spring—or a following spring—to spawn in this area. Some few of the even rather large cod recaptured in the following spring—or later—within the "Nordhavet" may be immature specimens, that have remained stationary within this area, and accordingly these have not yet made any spawning migration at all. Generally, however, the return migration to the spawning grounds shown by the recaptures is a characteristic spawning-migration. Most likely, the cod spawns every year after having reached maturity, at least for a series of years, but, as mentioned before, the fishing intensity within the Faroe area is so high, that only a very small percentage of the stock survives to spawn more than a couple of successive years.

It should be emphasized here that the Faroes presents in the principal spawning grounds of the "Nordhavet" an area of concentration for spawning cod closely corresponding to the famous and much larger and richer spawning grounds off South-Iceland (Selvogsbanki) and at the Lofoten in northern Norway.

Probably "Vaagohavet" and various other localities may be of some importance as spawning places; we know, however, very little about the intensity of spawning in these localities which are, in any case, of secondary importance.

Dansk Resumé.

Om Vandringer, der foretages af Torsk mærket paa Gydepladser ved Færøerne.

Indledning.

Igennem en længere Aarrække, fra 1909 til 1937, er der i færøske Farvande mærket ialt 7272 Torsk; en Oversigt over Mærkningerne og Genfangsterne er givet i Tabel 1. Særlig i Aarene 1927—37 er der mærket en stor Del Torsk større end 70 cm, som paa Grund af deres Størrelse maa have været kønsmodne eller have været nær Kønsmodenhed; ialt er 1139 Stortorsk mærket, hvoraf 209 eller 18.3 % er blevet genfanget. I nærværende Afhandling behandles disse Stortorsks Vandringer. De yngre Torsks Vandringer i Færøomraadet er derimod behandlet af A. C. Strubberg i to Afhandlinger (1916 og 1933), der dog ogsaa giver Oplysninger om de indtil 1927 samtidig mærkede, ret faa Stortorsk.

Mærkningerne af Stortorsk er udført om Foraaret, særlig i Marts—April, nogle dog ogsaa i Maj, og de er hovedsagelig, nemlig alle fra Marts og April, udført i Nordhavet paa den saakaldte »Vaargrund« (se Tabel 2 og Kortene, Fig. 6 flg.). Størrelsen af de mærkede Torsk er vist i Tabel 3. Da Flertallet af Stortorsken har været kønsmoden paa den Tid, de er mærket, giver Afhandlingen saaledes en Oversigt over disse Torsks Vandringer umiddelbart efter, at Gydningen er overstaaet og i de følgende Par Aar; Genfangsterne belyser især:

1) Bortvandringen fra Gydepladserne efter at Gydningen er afsluttet. For at opnaa en Belysning af denne Vandring, der er en Næringsvandring, anvendes Genfangster gjort i de efter Mærkningen forløbne 6—7 Maaneder, altsaa Genfangsterne særlig fra April—Oktober samme Aar, Mærkeforsøget blev udført.
2) Tilbagevandringen til Gydepladserne Aaret efter Mærkningen. For at opnaa en Belysning af denne Ynglevandring anvendes Genfangster gjort i Maanederne Januar—Maj i det efter Mærkeaaret følgende Aar.

De ganske enkelte Genfangster, der er gjort af Torsk, der har været saa længe ude, at de har oplevet en tredie (eller senere) Sæson i Havet, er ligeledes i de fleste Tilfælde medtaget i Oversigterne eller paa Kortene fra Forsøgene udført i Aarene 1927—37; iøvrigt er alle Genfangster, ogsaa af Torsk, der var mindre end 70 cm ved Mærkningen, nævnt i Listerne; de mindre Torsk er endvidere i ganske specielle Tilfælde omtalt lidt nærmere i Teksten.

I. Oversigt over Mærkningsforsøgene 1927—37 med Stortorsk paa Gydepladser ved Færøerne.

1. Mærkningsforsøg 1927.

Af de dette Aar i Marts mærkede 157 Torsk over 70 cm er 24 eller 15.3 % genfanget. Af Kortene Fig. 6—7 viser det første Genfangsterne af de Torsk, som i de følgende Maaneder,

April—Oktober, har spredt sig over Bankerne omkring Øerne (en enkelt er vandret til den nordlige Nordsø, hvilket er et sjældent Tilfælde, da meget faa Torsk overhovedet synes at forlade selve Færoomraadet). Det andet Kort viser, at Torsken næste Aar i Januar—Maj igen optræder i Nordhavet, altsaa paa Gydepladserne. Tabellerne 4a—c giver Forsøgets Detailler.

Andre Forsøg udført dette Aar i Maj Maaned omtales kun ganske kort, da STRUBBERG (1933) har omtalt dem, og da de kun delvis belyser de Spørgsmaal, som særlig behandles i nærværende Oversigt.

2. Mærkningsforsøg 1932.

Dette Aar mærkedes 164 Torsk over 70 cm i April, 62 i Maj; der genfangedes henholdsvis 32 (19.5 %) og 13 (21 %). Kortene Fig. 8 og 9 viser, hvorledes Genfangsterne fra April-Forsøget belyser de to Kategorier af Genfangster nævnt foran, nemlig dem fra Maj—Oktober i selve Mærke-Aaret og dem fra Januar—Maj Aaret efter Mærkningen. Man bemærker en Spredning over Bankerne efter Gydetidens Ophør og en Tilbagevandring til Nordhavet det følgende Aar.

Forsøget, der er udført i Maj 1932, er kort omtalt og viser lignende Resultater.

Tabellerne 5a—c og 6 giver Forsøgets Detailler.

3. Mærkningsforsøg 1934.

Der blev dette Aar kun mærket 14 Individer i April, hvoraf 3 blev genfanget samme Aar spredt over Bankerne. Se Tabel 7.

4. Mærkningsforsøg 1935.

Af 231 Torsk større end 70 cm mærket i Marts—April blev 42 eller 17.2 % genfanget. Kortene Fig. 10—11 viser Genfangsterne af de to Kategorier af Torsk, nemlig 1) de fra Gydepladserne bortvandrende Torsk (hvoraf een er gaaet til Færobanken, hvilket er et sjældent Tilfælde) og 2) de faa Genfangster i andet Aars Foraarsmaaneder (Fiskeriet var dette Aar yderst daarligt i Nordhavet).

Fra dette Forsøg er der i tredie og endogsaa i femte Aar genfanget en enkelt Torsk nær ved eller paa Gydepladserne i Nordhavet. At en mærket Stortorsk faar Lejlighed til at leve til i det femte Aar efter Mærkningen er et rent Undtagelsestilfælde i de færoske Farvande, medens det hyppigt er Tilfældet i islandske og grønlandske Farvande.

Tabellerne 8a—c giver Forsøgets Detailler.

5. Mærkningsforsøg 1937.

Ikke mindre end 411 Torsk større end 70 cm mærkedes dette Aar i April Maaned, og 69 Individer eller 16.8 % er blevet genfanget. Kortene Fig. 12—13 giver som i foregaaende Forsøg et Overblik over Genfangsterne, der meget klart viser 1) den omtalte Spredning efter Gydningen, samt 2) den paafølgende Koncentration af Torsk i Nordhavet det følgende Foraar (samt i det tredie Aars Foraar efter Mærkningen). Dette Forsøg er, takket være det ret store Antal Torsk, der blev mærket, særlig værdifuldt til Belysning af Vandringerne.

En enkelt Torsk fra dette Forsøg er genfanget ved Bjørnøen samme Efteraar (21. November) og har saaledes udført den længste Vandring, der kendes for Torsk mærket i Færøomraadet (sikkert mindst 1100 Sømil).

Tabellerne 9a—c giver Forsøgets Detailler.

II. Resultater vedrørende Stortorskens Vandringer opnaaet ved Mærkningsforsøg udført udenfor Yngletiden forskellige Steder i færøske Farvande 1909—36.

For at belyse, at Stortorsk, der er mærket udenfor Gydetiden andre Steder ved Færøerne end i Nordhavet, i mange Tilfælde netop søger hertil, naar de bliver kønsmodne, er Uddrag af de af Strubberg i 1916 beskrevne Forsøg anvendt og nærmere omtalt. Der er desuden givet et Kort (Fig. 14) med Lokaliteterne for de genfangede Torsk, der var over 70 cm ved Mærkningen, og som er blevet genfanget i Gydeperioden, Januar—Maj, Aaret efter eller to Aar efter Mærkningen. Man vil bemærke, at en Del af disse Torsk ganske tydeligt har søgt til Gydefelterne Nord for Oerne (Tabel 10 giver Detaillerne vedrørende disse Genfangster).

En Del andet Materiale fra de nævnte Forsøg samt fra en Række andre Forsøg udført hovedsagelig med Smaatorsk i Aarene 1923, 1924, 1925 og 1936 omtales kort Side 33.

III. Alder og Vækst af de mærkede og atter genfangede Stortorsk.

Nogle faa Oplysninger er givet om Alderen og Væksten af de genfangede Torsk. Det vises, at Alderssammensætningen af de genfangede Torsk, for hvilke brugbare Oplysninger foreligger, i det Hele og store svarer til den, man finder indenfor den Bestand af Torsk, som man fisker paa om Foraaret i Nordhavet, idet Flertallet er Torsk paa 4 til 8 Aar (Tabellerne 11 og 12 viser dette).

Endvidere omtales Væksten af de mærkede og atter genfangede Torsk — ganske kort, da Materialet kun er lille og ikke giver noget særlig nyt af Interesse; Væksten er ringe hos de mærkede Torsk de første Maaneder efter Gydningen (kun et Par Centimeter), hvilket paa Forhaand maa ventes, da den optagne Føde utvivlsomt den første Tid hovedsagelig medgaar til at give Fisken dens oprindelige Kraft tilbage, hvorefter Længdevæksten kan tage fat igen. Tabel 13 giver en Oversigt over en Del af Materialet.

IV. Sammenfattende Oversigt over Resultaterne af Mærkningsforsøgene med Stortorsk ved Færøerne.

Undersøgelser over Torskens Vandringer i et begrænset Omraade som det færøske er tilsyneladende let nok, men vanskeliggøres netop ved Omraadets ringe Udstrækning, fordi det her drejer sig om Forsøg med de stærkt vandrende kønsmodne Torsk. Dette vil straks blive iøjnefaldende, naar man betænker, at Erfaringer over den Hastighed, hvormed Torsken kan vandre (enten Vandringen nu foregaar mere passivt ved Hjælp af Strømmen eller mere aktivt ved Fiskens egen Kraft) maksimalt ligger op mod 10—15 Sømil pr. Døgn (18—28 km pr. Døgn), og at Færøomraadets Udstrækning indenfor 200-Meter Kurven fra Nord til Syd kun er godt 120 Sømil, fra Øst til Vest knapt 120 Sømil, samt at Strømmens Hastighed ved Færøerne er stor; det vil altsaa heraf fremgaa, at en mærket Torsk med Lethed i Løbet af 8—10 Dage vilde kunne bevæge sig fra den ene Ende af Omraadet til den anden. Saafremt Flertallet af Stortorsk foretog hurtige Vandringer i Omraadet med nævnte maksimale Hastighed, vilde Resultater af Mærkninger meget let udvidskes; men heldigvis er Bevægelserne af Flertallet øjensynligt meget lavere, hvorved det gøres muligt gennem det anvendte Forsøgsarrangement at opnaa et Billede af Bestandens Forskydninger i Rum og Tid.

En endnu større Vanskelighed ligger i det Forhold, at Torskefiskeriet i Færøomraadet er saa stærkt, at man allerede efter eet Aars Forløb kun faar ret faa Genfangster fra et bestemt Forsøg, og at man i det tredie eller følgende Aar næsten ingen Genfangster faar mere. Trods det, at ca. 1000 Stortorsk større end 70 cm er mærket, har Antallet af Genfangster i det tredie Aar (Kalenderaar) kun været 7 Stykker (eller 0.7 %); derefter er kun een eneste taget igen (4 Aar efter Mærkningen, se Side 23).

Tabel 14, Side 37, viser, hvorledes Genfangsterne fra de enkelte Forsøg fordeler sig paa de hinanden følgende Aar (Kalenderaar).

Et endnu mere ugunstigt Indtryk med Hensyn til, hvor længe man kan vente Genfangster af Stortorsk, der er mærket i Færøomraadet, faar man ved at betragte Tabel 15, der viser Antallet af alle Genfangster for hver Maaned efter Mærkningen. Man vil heraf se, at af de ca. 1000 Stortorsk er kun een eneste af de mærkede Torsk genfanget efter 24 Maaneders Forløb. Til Sammenligning skal nævnes, at Eksperimenter udført ved Island og Grønland har givet ikke ganske faa Genfangster endnu 48—108 Maaneder efter Mærkningen. Da den anvendte Mærkemetode er den samme ved Grønland, Island og Færøerne, og Afgangen saaledes ikke kan være et Udtryk for, at Mærkerne skulde tabes hurtigere af de ved Færøerne mærkede Torsk end andre Steder, viser dette Forhold bl. a. ogsaa, hvor hurtigt Torsken i Virkeligheden opfiskes i det færøske Omraade (sml. ogsaa Tåning, »Journal du Conseil«, 1937, Side 11—12).

Vi skal her forbigaaende bemærke, at der fra Fiskere, der har genfanget mærkede Torsk ved Færøerne, Island og Grønland, kun foreligger faa Oplysninger om, at Mærket og Solvtraaden i visse Tilfælde har frembragt et saa stort Saar i Fiskens Gællelaag, at der kunde være Fare for, at Mærket vilde være blevet tabt, hvis Torsken var blevet gaaende i Søen. Kun tre Tilfælde af denne Art foreligger i nærværende Materiale. Alleroftest angives Torskens Sundhedstilstand at have været god; i enkelte Tilfælde angives der at have været en Betændelse eller et Saar omkring Mærket, men for nærværende Materiale findes saadanne Angivelser kun for Torsk taget i Løbet af det første halve Aar efter Mærkningen. Det vilde være af stor Værdi, hvis de, der genfanger mærkede Fisk eller har Lejlighed til at se disse, i højere Grad end hidtil vilde give nærmere Oplysninger om, hvorledes Fisken havde taalt Mærkningen, saaledes at eventuelle Forbedringer f. Eks. med Hensyn til Typen af Mærke, dettes Anbringelse o. l. kunde forsøges.

Af Tabel 16 vil man endvidere faa et Indtryk af Fordelingen af Genfangster i de fem første Aars Maaneder; og man vil heraf se Foraarssæsonens store Overvægt med Hensyn til Genfangster af disse kønsmodne Fisk, der paa denne Aarstid koncentreres paa Gydepladserne, men ellers Aaret igennem er spredt over Bankerne. Desuden vil man se, at de første 3—4 Maaneder efter Mærkningen som sædvanlig giver flest Genfangster ved Færøerne.

Man vil af det foran nævnte forstaa, at der skal mærkes ikke helt faa Stortorsk, saafremt man ved Færøerne skal opnaa blot nogle faa Genfangster i 2. og 3. Aar. Og det maa fremhæves her, at man i Fremtiden bør bestræbe sig for at faa Resultaterne af nærværende Forsøg udbygget ved Mærkning af nogle Tusinde flere Stortorsk, selvom Bekostningerne hertil er ret betydelige.

Desuden maa vi i denne Forbindelse nævne en Aarsag, som til en vis Grad paavirker Materialet, nemlig at det er yderst tvivlsomt, om alle eller tilnærmelsesvis alle Mærker taget af Trawlere kommer til vor Underretning; dels overses en Del Mærker utvivlsomt, og dels er mange Trawlskippere for uinteresseret i Undersøgelserne til, at de afleverer alle de fundne Mærker. Derimod bemærkes paa Grund af den anvendte Fiskemetode sikkert næsten alle

Mærker paa Torsk fisket af Færinger, og det er utvivlsomt særdeles faa Mærker, som færøske Fiskere ikke afleverer.

Endelig maa vi her nævne en vigtig Aarsag, som bidrager til at vanskeliggøre en nøjagtig Udredning af de Vandringer i Rum og Tid, som foretages af Stortorsken ved Færøerne, nemlig Fiskeriets Vekslen fra Plads til Plads gennem Aarets Maaneder. Man maa jo nemlig stadig huske paa, at Genfangsternes Lokaliteter er bestemt af Fiskeriets Lokaliteter, og at vi intet ved om Forekomsten af mærkede Fisk paa Felter, hvor der ikke i paagældende Sæson, eller maaske overhovedet slet ikke, drives Fiskeri. Det vil derfor være nyttigt i denne Forbindelse kort at skitsere Tid og Sted for de vigtigste Fiskerier i Omraadet.

Det færøske Fiskeris Hovedfelter er om Foraaret »Vaargrunden« i Nordhavet og Vaagohavet i Omraadet Sydvest for Vaago-Sandø, og om Efteraaret særlig Omraadet Vest for Sudero og omkring Munken (en Oversigt over Størrelsen af den Fisk, der tages paa de vigtigste af disse Lokaliteter er givet i Fig. 5). Selvfølgelig fiskes der ogsaa andre Steder omkring Oerne og sine Steder til alle Tider af Aaret, men de nævnte Lokaliteter er de vigtigste. Af Genfangsterne i Mærkningsforsøgene falder kun ca. 20 % paa færøske Baade, og Hovedmængden af disse er taget om Foraaret i Nordhavet. Ca. 80 % af Genfangsterne falder imidlertid paa Trawlerne, hvilket Tabel 17, Side 39, viser.

Trawlfiskeriet, der drives næsten udelukkende af engelske og skotske Trawlere, er det vanskeligere at lokalisere med Hensyn til Sæson paa de vidtstrakte Banker omkring Øerne. Ifølge forskellige Oplysninger er Trawlfiskeriet om Foraaret, i Marts til Maj, i høj Grad begrænset til Nordhavet, og særlig i April kan mange Trawlere være samlet her; men iøvrigt arbejder der Trawlere næsten overalt i Færøomraadet til enhver Tid af Aaret. For at vise dette er der i Tabel 18 givet en Oversigt baseret paa Inspektionsskibenes Observationer af Trawlere igennem en Række Aar. Disse Observationer stammer ifølge deres Oprindelse hovedsagelig fra Omraadet omkring Fiskerigrænsen (3-Mile Grænsen) og giver selvfølgelig ikke et helt udtømmende Billede af Trawlernes Fordeling paa ogsaa de mere landfjerne Fiskefelter, som f. Eks. udfor Myggenæs, udfor Fuglø o. l. Steder. Tabel 18 viser, at der i Færøomraadet daglig arbejder 35–38 Trawlere, og da man i Almindelighed regner med, at gennemsnitlig ca. 40 Trawlere daglig arbejder omkring Øerne, vil det antagelig ikke være et meget urigtigt Billede, Tabel 18 giver af de virkelige Forhold. Det er ikke her nødvendigt at forklare, hvorledes Tabellen er udarbejdet paa Grundlag af Inspektionsskibenes Observationer, men vi skal nøjes med at nævne, at de enkelte Tal giver Gennemsnittet af Trawlere observeret fiskende indenfor de afgrænsede Omraader (Fig. 15) i paagældende Sæson. Kun Observationsdage, paa hvilke arbejdende Fiskeskibe af en eller anden Art er observeret i paagældende Omraade, er anvendt, bl. a. af Hensyn til det foreliggende Materiales Natur og for at udelukke de talrige Taage-Dages uheldige Indflydelse m. v.

Man vil nu af Tabel 18 se, at der er en tydelig Koncentration af Trawlere om Foraaret i Nordhavet, men der er dog ingen Tid paa Aaret, hvor Trawlere ikke kan træffes arbejdende et eller andet Sted omkring Øerne. Der vil saaledes, saafremt den mærkede Fisk er til Stede, selvfølgelig blive en Koncentration af Genfangster i Nordhavet om Foraaret; men paa den anden Side finder der i Nordhavet ogsaa senere paa Sommeren en Del Trawlfiskeri Sted, nemlig bl. a. paa Rødtunge og Kuller, og saafremt mærkede Torsk fandtes her om Sommeren i større Antal, vilde nogle ikke undgaa at blive taget. Naar mærkede Torsk paa denne Tid praktisk talt helt mangler i dette Omraade, men ellers findes spredt over snart sagt hele Færøomraadet (se Kortene), maa det betyde, at de udgydte Torsk helt eller for største Delen er vandret bort fra Foraarets Gydefelter.

Et Omraade, som ikke bliver nær saa meget befisket som selve Bankerne ved Færøerne, er Skraaningerne mod det dybere Hav til alle Sider for Øerne. Paa disse Skraaninger er der mange saa klippefulde og stenede Felter, at Trawlere ikke kommer der, eller der er en saa rig Bevoksning af Svampe (Spongier), selvom der er renere Partier ind imellem, at de sjældnere arbejder her, selvom noget mere i nyere Tid end tidligere; her kunde man derfor tænke sig, at en Del af de Torsk, som overlever Trawlsæsonen fra Juni til næste Vinter og Foraar, finder et Fristed. Paa disse Felter foregaar der i nyere Tid en Del Fiskeri med Langline, dels efter Torsk, store Kuller samt Brosme o. l., dels efter Helleflynder. Enkelte mærkede Torsk er da ogsaa taget her særlig i Sommermaanederne, paa hvilken Tid Fiskeriet særlig finder Sted her.

Man vil af de foregaaende Betragtninger se, at der er visse Forhold, som medfører, at det indvundne Materiale af Genfangster af mærkede Stortorsk maa bedømmes med en vis Forsigtighed; paa den anden Side er de opnaaede Resultater saa iøjnefaldende, at selv de nævnte Aarsager, som til en vis Grad kunde tænkes kunstigt at frembringe netop det opnaaede Billede, ikke paa langt nær alene kan tilskrives at være Aarsag til netop den forefundne Fordeling af genfangede Torsk igennem Aarets Maaneder.

Efter de foregaaende Bemærkninger vedrørende Bedømmelsen af Materialet skal vi derpaa i det følgende give en Oversigt over Hovedresultaterne.

Med Støtte af en Serie Oversigtskort (Fig. 16—17, Side 42—43) og en tabellarisk Oversigt (Tabel 19) er en let overskuelig Sammenfatning af Resultaterne fra de beskrevne Mærkningsforsøg givet.

Paa de to Serier Kort, Fig. 16 og 17, er afsat alle saadanne Genfangster fra Forsøgene 1927—37, der har tilstrækkelig nøjagtige Positionsangivelser; Aaret er delt i fire Sæsoner, Januar—Maj, Juni—Juli, August—Oktober, November—December, og Genfangster fra hver af disse Sæsoner er samlet paa hver sit Kort. Genfangster fra det lille Forsøg udført medio Maj 1932 er medtaget paa disse Kortserier. Den ene Serie Kort (Fig. 16) giver en Oversigt over Genfangsterne i Løbet af det 1. Kalenderaar, den anden Serie Kort (Fig. 17) over Genfangsterne i Løbet af 2. og 3. Kalenderaar. Tabel 19 er inddelt i Sæsoner paa lignende Maade som Kortene, og hele Færøomraadet er delt i syv Felter (se Fig. 15), hvoraf Nr. 1 omfatter Gydefelterne af størst Vigtighed.

Man vil se af Kortene og Tabellen, at der efter Mærkningen foregaar en tydelig Spredning af Torsken over Bankerne, særlig kraftigt i Løbet af den Maaned, der følger umiddelbart efter selve Mærkemaaneden. I selve Mærkemaaneden falder derimod alle Genfangsterne (100 %) i umiddelbar Nærhed af Mærkepladserne. Man vil endvidere af Kortet Fig. 16,1 samt af Tabel 19 se, at endnu i Maj er kun faa Torsk genfanget langt sydpaa, f. Eks. Syd for ca. 62° nordlig Bredde.

I de følgende Maaneder af Aaret fra Juni til December er der praktisk talt ikke genfanget nogen Torsk i Mærkepladsens umiddelbare Nærhed, medens der stadig genfanges en Del i de Omraader, der ligger Vest og Ost herfor, samt ikke mindre end 44—50 % i de sydligere Omraader, Syd for ca. 62°. Særlig tydeligt fremtræder Spredningen, hvis man f. Eks. undersøger, hvor høj en Procent af Genfangster det er, der falder paa det sydligste Omraade (Nr. 7) i Perioderne April—Maj, Juni—Juli og August—Oktober; Procenten stiger i de tre Perioder fra ca. 3 % til ca. 11 % og naar ca. 22 % i August—Oktober. Sidst paa Aaret synes man derpaa at kunne spore en Tilbagevenden mod Nord, muligvis til Dels *via* Vestsiden

af Øerne (Vaagøhavet); man vil saaledes bemærke, at Kortet for November—December ligner Kortet for Juni—Juli.

Fra Gydepladserne i Nordhavet (»Vaargrunden«) spredes altsaa Torsken efter Gydningen under den paafølgende Næringsvandring saavel mod Vest som mod Øst og længere mod Syd i Løbet af de følgende Maaneder; hen paa Sommeren, samt først paa Efteraaret, er mange af dem naaet til Omraadet omkring Suderø eller Syd herfor, og dette stemmer da ogsaa med, at der her, f. Eks. ved Munken, paa denne Tid af Aaret kan finde et ret stort Fiskeri Sted paa større Torsk. Mange Torsk forbliver dog ogsaa paa visse Bankomraader nordpaa, f. Eks. paa Myggenæsgrundene. Derimod ved vi meget lidt om, hvorvidt en Del søger ud paa Skraaningerne mod Dybhavet til forskellige Sider af Øerne; som man imidlertid vil se af Kortene, og som allerede nævnt, er der nu og da taget enkelte mærkede Torsk herude, udenfor 200-Meter Kurven.

Det angives i Almindelighed af færøske Fiskere, at Torsken, efterhaanden som Gydningen forløber og mod Slutningen af Gydningen, trækker mere og mere mod Øst, hvilket vil sige i Strømmens Hovedretning. En Betragtning af nærværende Materiale viser dog, at der sker en Spredning baade mod Øst og mod Vest, og der er endogsaa taget ca. dobbelt saa mange mod Vest som mod Øst. Dette kunde tyde paa, at Flertallet vandrer mod Vest; men man kan dog næppe slutte dette af Forsøgene, idet det maa bemærkes, at næsten alle Genfangster fra de aabne Banker hen paa Sommeren stammer fra Trawlere, og at disse aabenbart arbejder mere mod Vest end mod Øst, hvorfor en Afgørelse af Mængdefordelingen ikke lader sig udføre paa Grundlag af det foreliggende Materiale. Det er dog ganske klart, at der finder en Spredning Sted saavel mod Øst som mod Vest, ikke énsidig den ene Vej; men muligvis veksler dette Forhold noget fra Aar til andet.

Betragter man derpaa det første Sæsonkort i den anden Serie Kort (Fig. 17), der omfatter Genfangster i Vinterens sidste Halvdel samt om Foraaret, altsaa i Torskens Gydeperiode, vil man se, at Genfangsterne særlig udviser en Koncentration i det Omraade, hvor Stortorsken blev mærket det foregaaende (eller næstforegaaende) Foraar. Ogsaa Tabel 19 fremhæver dette Forhold, idet der i denne Periode er taget ca. 57 % af alle Foraars-Genfangsterne netop i nævnte lille Omraade, altsaa paa samme Sted, hvor der i det foregaaende halve Aar kun blev taget et Par Stykker. Iøvrigt er 94 % af alle de Torsk, der blev genfanget i Januar—Maj, fisket i det nordlige Omraade, Nord for 62° nordlig Bredde; og Tabel 18 viser dog, at der paa denne Tid trawles ogsaa mange andre Steder omkring Øerne, selvom Hovedfeltet absolut paa denne Aarstid er Nordhavet.

Senere hen paa Aaret i det andet Aar genfanges der meget faa Torsk (Fig. 17, 2—4), men disse er ligesom Aaret forud spredt ud over Bankerne, og de er i hvert Fald taget fjernt fra Gydefelterne. Fra det tredie Aars Foraar foreligger kun 6 Genfangster med sikker Position, de er alle indlagt paa forannævnte Kort (Fig. 17, 1) og er koncentreret om Gydefeltet i Nordhavet.

Forsøgene viser altsaa, at i hvert Fald en stor Del af de overlevende Torsk, der eet Foraar er mærket i Nordhavet paa Gydepladserne, næste (eller et følgende) Foraar atter vender tilbage til dette Omraade for at gyde[1]), og denne Returnering er saaledes en udpræget Ynglevandring. Antagelig gyder Torsken hvert Aar, naar den er

[1]) Nogle af de, endogsaa ret store, Torsk, der det følgende Foraar eller senere tages i Nordhavet, kan være umodne Individer, der har været stationære i dette Omraade, og altsaa endnu ikke har foretaget nogensomhelst Ynglevandring. Nogen større Rolle i Bestanden af Storfisk i Nordhavet spiller disse umodne Individer dog øjensynligt ikke.

blevet kønsmoden, i hvert Fald gennem en Række Aar, og den foretager derfor antagelig en ret regelmæssig Til- og Bortvandring til og fra Gydeomraadet igennem flere Aar. Fiskeriet er dog som nævnt saa stærkt i Færøomraadet, at det kun er en meget lille Del af Bestanden, der naar at forplante Arten mere end et Par Aar i Træk.

Det maa understreges her, at Færøomraadet i Nordhavets Gydefelter har Koncentrationsomraader for de gydende Torsk, der biologisk ganske nøje svarer til de meget større og rigere Gydefelter ved Syd-Island (Selvogsbanki m. v.) og ved Nord-Norge (Lofoten).

Muligvis har Vaagøhavet og nogle andre Lokaliteter ogsaa en vis Betydning som Gydepladser; men vi kender endnu kun lidt til Forholdene paa disse Gydepladser af sekundær Betydning.

Nr. 6 A. C. Strubberg: Marking Experiments with Plaice and Lemon Soles at the Færoes in 1910—12. 28 Fig. 1918. 64 p. Kr. 2.25.

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Bind VI.

» 1 P. Jespersen: On the occurrence of the postlarval stages of the Herring and the »Lodde« (Clupea harengus L., and Mallotus villosus O. F. M.) at Iceland and the Færoes. 1920. 10 Fig. 24 p. Kr. 1.25.

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Bind VII.

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